TECHNOLOGY DEPT.

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TELEPHONE ENGINEER

MANAGEMENT

THE NATIONAL TELEPHONE MAGAZINE

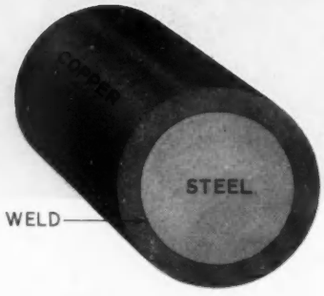
NOVEMBER 15, 1942

When this much copper has sufficient conductivity and protects from corrosion--it is wasteful to use this much for mechanical strength. Copperweld can use this much copper and this much steel---and <u>do the same job with a clear saving of 70% copper.</u>

COPPERWELD STEEL COMPANY · GLASSPORT, PA.

Save hundreds of tons of Copper with COPPERWELD

(COPPER-COVERED STEEL)



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Built for LONGER service...

NEITHER the giraffe's long neck nor Whitney Blake's long-life drop wire are accidents. Both were *engineered* that way to solve the problems of "maintenance" and to provide best all-'round results, under "operating" conditions.

Back of every foot of Whitney Blake wire and insulation is a program of unremitting research that has "built in" these and other essential advantages:

. . . extra-heavy braid to hold more weatherproof saturant.

. . . high degree of adhesion between rubber and conductor to stop moisture penetration.

. . . uniform composition with proper antioxidents to provide extra staying power.

. . . extra "muscle" in the rubber insulation to withstand crushing at clamps and knobs.

So, for fewer service interruptions, less frequent replacements, fewer calls on the time of busy service crews, insist on Whitney Blake "longer life" drop wire. It costs less *by the service-year.*

★

DROP WIRE . . . DISTRIBUTING FRAME WIRE
DUCT WIRE . . . INSIDE WIRE . . . BRIDLE WIRE

★

*GraybaR Distributed by *GraybaR ELECTRIC COMPANY

SINCE 1869 *REG U.S. PAT. OFF.

WB

THE WHITNEY BLAKE CO.
New Haven, Conn.
Well Built wires since 1899

IN NO-MAN'S LAND . . . IN OUR OWN LAND. G

This photograph shows a U. S. Army unit laying telephone field wire from a truck.

Photo by U. S. Army Signal Corps

CONSTRUCTION MATERIAL

Anchors: Guy, Nail and Screw
Bolts: Carriage, Machine and Lag
Braces: Crossarm, Back and Angle
Brackets: House, Pole and Transposition
Cable: Telephone and Switchboard
Clamps: Guy, Span and Cable
Conduit: Clay, Fibre and Wood
Clips: Guy, Drop Wire and Test
Crossarms: Creosoted Pine and Douglas Fir
Guards: Cable, Hub, Manhole and Tool
Grips: Cable, Drop Wire and Buffalo
Insulators: Glass, Porcelain and Strain
Kits: First Aid and Tool
Knobs: Porcelain and Knob Racks
Ladders: Extension, Step and Platform
Manhole Covers, Frames and Guards
Nails: Galvanized and Pole Dating
Poles: Creosoted Pine, Northern and Western Cedar
Rings: Bridle, Cable and Drive
Rods: Anchor, Duct and Ground

TOOLS

Augers and Blow Torches
Bolt Cutters and Digging Bars
Jacks: Cable and Pole
Linemen's Belts, Climbers and Straps
Pike Poles, Pliers and Pulleys
Screw Drivers and Soldering Irons
Tool Bags and Tool Kits
Tree Trimmers and Wrenches

WIRE

Drop: Kellogg Armored Bronze
Drop: Copper and Iron
Indiana Crapo Iron Telephone Wire
Indiana Crapo Galvanized Steel Strand
Bridle and Tree
Jumper and Interior
Lashing and Bonding

PROTECTION

Arresters and Arrester Carbons
Arrester Blocks and Arrester Clips
Fuses for Arresters and Cable Terminals
Fuse Wire: Bronze and Copper
Terminals: Cable and Terminal Boxes

Keep Your Lines in Shape to Meet War-Time Demands

Of all the factors on which an army in the field stakes its chances for Victory, uninterrupted communications is one of the most important.

Similarly, this Nation's great civilian army vitally depends on the maintenance of domestic communications for success in its fight—the fight for more production. Factory workers and managers, farmers, and all others engaged in helping produce for Victory take for granted that the Independent telephone industry will shoulder its share of the load with traditional thoroughness.

For the telephone company, this involves a four-point program: (1) A thorough-going check-up of lines and equipment at once to discover every weak link in the systems under its management; (2) Getting repair work

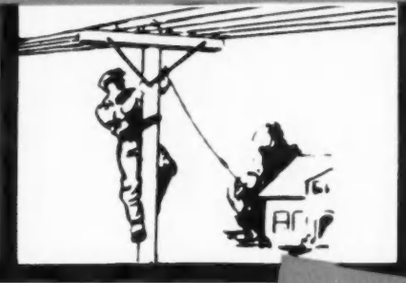
KELLOGG

GOOD TELEPHONE LINES ARE VITAL

Depend on KELLOGG

For Help In

Keeping Your Communication Lines Open



under way immediately; (3) Making all repairs with an eye to permanence, to insure unfailing service and to conserve materials for the War Program; (4) Constant alertness to keep equipment in first-class operating shape at all times.

To assure success in your program to keep lines open, make Kellogg your source for line supplies. With a network of over 50 basic warehouses at strategic locations throughout the country, Kellogg is able to give you efficient service on pole line hardware, construction materials and telephone supplies of all kinds. Here, your orders are handled by men qualified by long experience. This is your assurance of getting products that are pre-selected for quality and durability . . . and they are backed by the Kellogg DOUBLE GUARANTEE.

Be prepared to keep your lines in condition to meet the urgent demands of war-time service . . . depend on Kellogg for the necessary prompt, intelligent service on all your needs.

KELLOGG SWITCHBOARD & SUPPLY CO.
6650 SO. CICERO AVE. CHICAGO, ILLINOIS

For the convenience of the whole Independent telephone industry, Kellogg employs a nation-wide network of over 50 basic distribution points for line supplies.

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Baltimore, Md.
Bedford, Mass.
Boston, Mass.
Brewton, Ala.
Cedar Rapids, Ia.
Centralia, Ill.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, O.
Cortland, N. Y.
Dallas, Tex.
Decatur, Ill.
Detroit, Mich.
Fairfield, Iowa
Gladstone, Miss.
Harrison, N. J.
Hartford, Conn.
Jackson, Tenn.
Kansas City, Mo.
Kenosha, Wis.
Los Angeles, Calif.
Louisville, Miss.
Macomb, Ill.
Marion, Ind.
Minneapolis, Minn.
Muncie, Ind.
Muskegon, Mich.
Newark, N. J.
New Orleans, La.
Norfolk, Va.
Oshkosh, Wis.
Ottawa, Ill.
Panama, Okla.
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Phillipsdale, R. I.
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Portland, Ore.
Rochester, N. Y.
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St. Louis, Mo.
St. Paul, Minn.
Sand Point, Idaho
San Francisco, Calif.
Savannah, Ga.
Seattle, Wash.
Sycamore, Ill.
Versailles, Mo.
Winfield, Tex.
Etc., Etc., Etc.

Line Supply Service

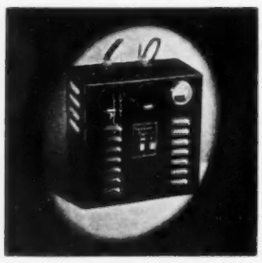
EXTRA EDITION

Telephon

An Advertisement of Leading Supply Manufacturers Whose Produ[cts] Distri[bute]

KELLOGG HAS A REAL[LY]

FANSTEEL RECTIFIERS PROVIDE AUTOMATIC CHARGE REGULATION



These dependable Fansteel Balkite Taper rectifiers provide automatic charge regulation for PBX, toll and small central office batteries at the lowest possible cost. Operation is extremely simple. After charging rate is set to meet the average normal load requirements, charge rises and falls in proportion to load demand and variations in battery voltage. The charge automatically follows the load, rising with increased traffic and tapering off during light load periods. No overcharging, no undercharging. Write for Fansteel Bulletin TC-51.

ODD.....BUT TRUE!

IN FOUR MINUTES
A MACHINE GUN USES AS MUCH COPPER AS A MILE AND A HALF A 19 GAUGE TELEPHONE WIRE, OR MORE THAN 30½ POUNDS!
ISN'T ONCE ENOUGH?
LIGHTNING STRUCK TWICE WITHIN ONE WEEK, DISRUPTING TELEPHONE SERVICE BOTH TIMES, ACCORDING TO WILLIAM LYONS MANAGER OF CANTON (MO) EXCHANGE OF THE WESTERN LIGHT AND TELEPHONE CO.
SAFEST BUILT!
THIS COFFING SAFETY-PULL RATCHET LEVER, HOIST CANNOT SLIP OR DROP THE LOAD. THE LOAD IS ALWAYS LOCKED AND THE HANDLE IS UNDER CONTROL.

Kellogg Koiled Kords Stretch Out 60 Inches

Kellogg Koiled Kords work as smooth as a coiled spring and easily stretch out to 60 inches. Of great importance to you is the fact that these cords save telephone breakage because they are not apt to tangle with other objects or catch under desk or table corners. The action of Kellogg Koiled Kords is entirely secured by molding the outer rubber covering into the permanent coiled shape. This patented construction makes it the longest wearing cord of this type since no mechnical means is used to provide the retractable action.

Sub-Cycle Ringing Machine Saves On Maintenance Costs

No routine maintenance is required on this Sub-Cycle Ringing Machine. It has no moving parts, making it a practically foolproof source of economical ringing current. It operates on A.C. and produces a powerful, uniform ringing current independent of frequency variations. It is thoroughly field tested and has proved in hundreds of installations that it will give many years of dependable, economical ringing service. Also furnished with Pulsator. 6 models to choose from with 20 to 50 watt outputs.

Kellogg's Famous "No. 5" Is Tape That "Stays Put"

Time is more precious today than ever. Things have to be done right the first time. That's why it pays to use good tape—like Kellogg's famous No. 5. For this is the stickin'-est, toughest, smoothest tape a telephone man can lay his hands on, and has been for many years. It stays fresh through all the seasons, resists oxidation, and makes the job right the first time, and for a long time to come. Furnished in black in ¾" and 2" widths. Specify Kellogg No. 5 Friction Tape on your next order.

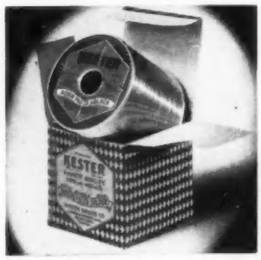
...one Facts

EXTRA EDITION

...ose Products Distributed by the Kellogg Switchboard and Supply Company

...LINE SUPPLY SERVICE

KESTER ROSIN-CORE SOLDER IMPROVES TRANSMISSION

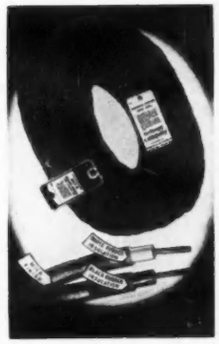


Now that it is so vital to our war effort to conserve critical materials such as tin, employ a solder that "stays put" and assures maximum results—Kester Rosin-Core Solder. Solder-protected joints eliminate high resistance points and intermittent open and closed circuits. For many years, Kester Rosin-Filled Solder has been known as the most satisfactory product of its kind. Nearly 1½ tons of this solder are used every year in the Kellogg factory alone! So to save your time and money, and improve transmission, use Kester Solder. Available on 1-, 5- and 20-pound spools.

Cramer Posture Chair Will Aid Operator's Efficiency

The scientific, adjustable posture support of these modern Cramer Posture Chairs makes operators more comfortable and efficient. 4 adjustments, easily made without tools, make Cramer Chairs adaptable and comfortable for everyone. The seat and back are padded with soft, resilient Whipped Foam Latex "Air Flow" cushions. Movement by the occupant makes air circulate throughout, keeping the seat and back always cool and comfortable. The seat and back covers are easily removed for cleaning or replacement. Write for circular which gives complete details.

Kellogg Drop Wire Is Famous For Long Service



Millions of feet of Kellogg Bronze Drop Wire are now in service throughout the country—practical evidence of the unusual efficiency and long service life for which this drop wire has become famous. Look at these features: A special armored coat of Mica; a better method of tracer identification, banishing forever the old wear-inducing raised tracer; long life, moisture-proof insulation; a solid bronze conductor for 85% conductivity, 32 ohms resistance, high tensile strength and ductility.

Hemingray Insulators Will Cut Your Operating Costs

When a glass insulator can be had that outlasts the pole it's used on, telephone men establish that insulator as their standard. So Hemingray, through carefully controlled production which assures this extra long life, has earned its "first place" position. Made by Owens-Illinois Glass Co., these Hemingray Insulators are impervious to moisture—do not age or deteriorate—have high mechanical and sustained dielectric strength. They are unaffected by sudden temperature changes, and are available in all styles. Specify Hemingray Insulators and cut your operating budget.

Carefully Selected Products, Well Located Warehouses and Expert Service Men

What with the material scarcities, high labor-turnover and congested transportation facilities throughout the nation that exist today, telephone men are grateful for an organization like Kellogg.

Many factors were necessary to build Kellogg's enviable reputation for the finest telephone line supply service. Kellogg engineers and executives know what will best meet the requirements in line construction and maintenance. Before these men place their stamp of approval back of a product, it not only must be good, but the best obtainable at the price. Kellogg protects its customers by carefully and rigidly testing many of the materials they recommend. Often the men in the Kellogg research laboratory actually work hand-in-hand with manufacturers of a product to perfect or improve it to the Kellogg standard. Today, in the rush of war's demand upon communications, this assurance of getting the best in line supplies is one worry that may be avoided.

But it is not enough to be certain of quality materials and equipment—geography enters into the picture. Kellogg's widely-flung coast-to-coast warehousing system includes fifty ideally located stockrooms from which line supplies are shipped with minimum loss of time. Orders are handled by people of long experience in telephone work . . . an important factor in this highly specialized field.

It is not too often that we get "hipped" on a subject to the point where we continue to harp on any given idea until that subject might grow stale with repetition. We have been guilty of this recently and in this issue are going "whole hog." We are speaking of Conservation. Besides editorializing on page 19 we are presenting the ideas of the vice chairman of the USITA Defense Committee on The Coming Shortage of Critical Materials on page 23. Not satisfied with just that our Technical Editor B. C. Burden continues his series on Conservation of Telephone Plant. We especially request each reader to check the above features and then check with yourself to see if you are doing all you possibly can to win this war.

▼

We were very sorry to get the report from Mr. H. T. McCaig of Stromberg-Carlson that Mr. M. E. Shipley of Hooper, Nebr. is quite ill. You old timers will remember him as the manager of the Hooper Telephone Company with exchanges at Hooper, Euhling and Winslow, Nebr. He is a real Independent pioneer although his health made him relinquish the managership of the company some time ago.

▼

The Signal Corps and the National Association are quite anxious that all operating telephone companies review their Bulletin issued one month after Pearl Harbor. To refresh you on the subject we are reproducing it on page 30.

TELEPHONE ENGINEER

MANAGEMENT · ENGINEERING · MAINTENANCE

Vol. 46. No. 11 NOVEMBER, 1942

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THE HANDLE WITH CARE sign is important today. It belongs on every tool and on every piece of equipment in America. We can't afford a speck of waste, and even the toughest equipment will last longer when cared for properly.

For example, your sturdy, long-lived, dependable Exide Batteries will last even longer if you follow the simple maintenance steps given on this page. The rule of the day is *Handle With Care.* Treat your batteries right . . . and you help treat the Axis rough.

MAKING BATTERIES LAST HELPS STOP THE AXIS!

1 Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.

2 Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.

3 Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.

4 Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 3225.

Exide

TELEPHONE BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

The Calculagraph prints a card like the above, which tells exactly when the conversation started and automatically figures the elapsed time to the second. It can't make mistakes in figuring, so there's no chance for disputes.

The Calculagraph is made in two electrically operated models which print elapsed time to the second on standard toll tickets, and one eight-day spring-driven model which prints in minutes and quarter minutes, with five-second indications.

Write for particulars. *Model No. 33*

CALCULAGRAPH CO.

308 SUSSEX ST. HARRISON, N. J.

CALCULAGRAPH

Accurate Toll Timing to the Second!

MAINTENANCE MEN SAY

"PROTEK-SORB DESICCANT

does a better job in less time!"

Protek-Sorb Desiccant reduces maintenance . . . gives you completely dry cable splices that stay dry. Leading telephone companies are using this method to the exclusion of slow, wasteful, dangerous boiling-out or oven-drying methods, because actual field tests have proven that Protek-Sorb dries cable splices BETTER and FASTER. It has more than *twice* the efficiency of other desiccants. Your regular jobber can supply you.

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Industrial Sales Department

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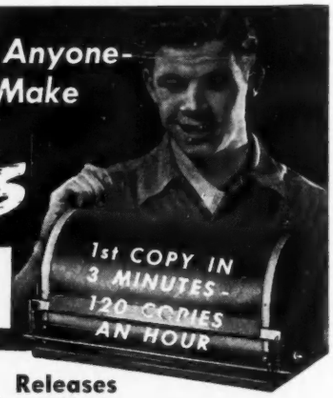

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Staying Power

Now, when replacements are almost unthinkable, staying power is exceedingly important. And General Cable wires and cables really have it—plenty. Craftsmen-built of tested materials to the most exacting standards, they give a thumping good account of themselves, rain or shine, year in and year out. They'll never let you down.

GENERAL CABLE

TELEPHONE WIRES AND CABLES

DISTRIBUTED BY

AMERICAN
AUTOMATIC ELECTRIC
SALES COMPANY

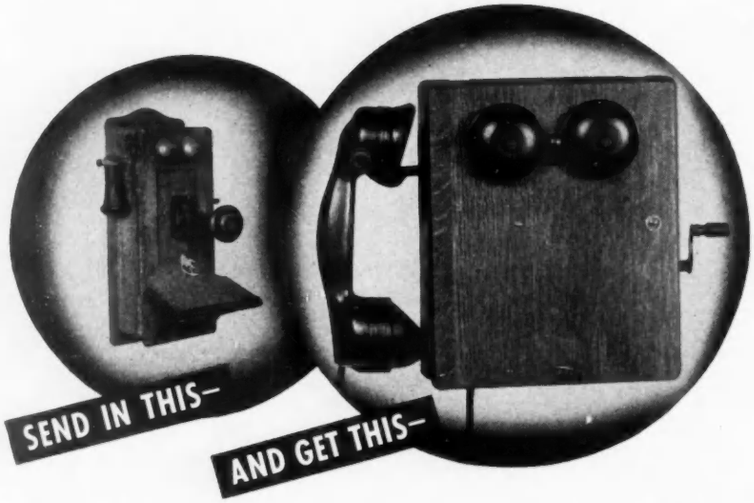
1033 WEST VAN BUREN STREET · CHICAGO, ILLINOIS
BRANCH WAREHOUSES AT DALLAS, KANSAS CITY, LOS ANGELES, RICHMOND (VA.)

TODAY'S PROBLEM

MAINTAIN SERVICE
and
CONSERVE MATERIAL

TODAY'S SOLUTION

use
AR SERVICE



It's as simple as 1, 2, 3. By using AR Rebuilding Service you can furnish up-to-the-minute service yet still help conserve materials by eliminating, or reducing to a minimum, your requirements for new equipment.

AR Rebuilding is more than a repair service. Every piece of equipment going through the AR *factory* process is stripped right down and rebuilding is begun with the smallest part. Cabinet—receiver—mouthpiece—wiring—everything, is made like new and all apparatus is modernized at the same time. Check your obsolete or worn-out equipment now — prepare your exchange to meet today's demands. Write for prices and facts on AR Rebuilding.

NOTE: Orders for Autelco Rebuilding service may qualify for priority rating under Maintenance and Repair. Please include priority certification with all orders.

THE MARK OF QUALITY IN REBUILDING SERVICE

AR
Autelco Rebuilt

AUTOMATIC ELECTRIC
ORIGINATORS AND DEVELOPERS OF STROWGER STEP-BY-STEP MACHINE SWITCHING AUTOMATIC DIAL SYSTEMS

MAKERS OF TELEPHONE, SIGNALING AND COMMUNICATION APPARATUS
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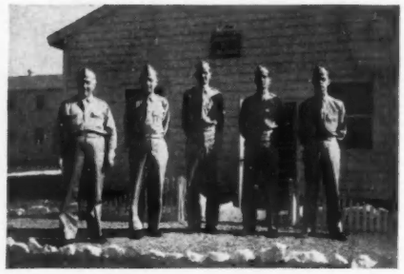
LETTERS

from TELEPHONE ENGINEER readers



Officers of the 217th Signal Depot Co., Camp Crowder, Missouri.

Left to right: Major Fred D. Ordway, Capt. George S. Blake, Lieuts. Newman L. Hart, Arthur J. Isaac, Richard D. Miller.

October 15, 1942

Dear Ray:

I regret I am not with you all today in sessions of the National Association but, as you say, I hope the time is not too far away when we all can meet again.

I sincerely appreciate all the kind favors you have always given me and the grand work your magazine is doing for the telephone industry.

I am enclosing a print of the officers of the 217 Signal Depot Company which I thought you might have some use for, particularly so on account of it being an affiliated unit of the Associated Telephone Company.

Again I want to thank you for all your kindness.

Sincerely yours,
Geo. S. Blake

◆

Dear Mr. Smith:

The mail service to these parts has, of late, been quite irregular due to the shipping shortage, but recently a ship did arrive bringing among other things the last July issue of your magazine together with several of your renewal notices. We particularly like the literary style of the last notice (dated July 1, 1942) and the type used for the rubber stamp which reads "Final Notice". This is a lot more business-like than making remarks about "delinquent" subscriptions; particularly when the guys to blame for the delay live on the other side of the ocean.

But just to prove to "youse guys" over in the windy city that we tropical rats have also been losing a lot of sleep over the financial stability of the TELEPHONE ENGINEER Publishing Corporation, I am sending you by airmail a money order against the First Boston International Corporation No. 3426 dates August 26th, 1942,

(Please turn to page 34)

P&H NORTHERN WHITE CEDAR POLES

STANDARD OF THE TELEPHONE INDUSTRY FOR 41 YEARS

Ample Stocks READY NOW for Prompt Shipment

P&H Northern White Cedar Telephone Poles have been supplied to U. S. Army Signal Corps, U. S. Army Air Corps Communication Service, U. S. Civil Aeronautics Administration, and many contractors doing Government work—all over the North American continent. These poles combine strength with light weight, easy handling, large butts for firm anchorage, inherent durability, low conductivity, neat appearances.

Butt-Treatment—Specification "AA", a low-priced, 15-minute duration treatment, using hot creosote.

"P&H PROCESS" insuring a saturation of at least 36 pounds of creosote per cubic foot to a sapwood depth of ½-inch throughout the groundline area, for longest pole life.

P&H *PENTA* POLES

FULL-LENGTH TREATED in highly chlorinated phenol solution many times more toxic than other preservatives in common use. Insures against sapwood deterioration and termites. Non-corrosive, non-conductive, pleasing in color,—the poles are clean, dry, easy to handle. Write for full information.

PAGE AND HILL CO.

MINNEAPOLIS, MINNESOTA · 50 CHURCH STREET, NEW YORK, N. Y.

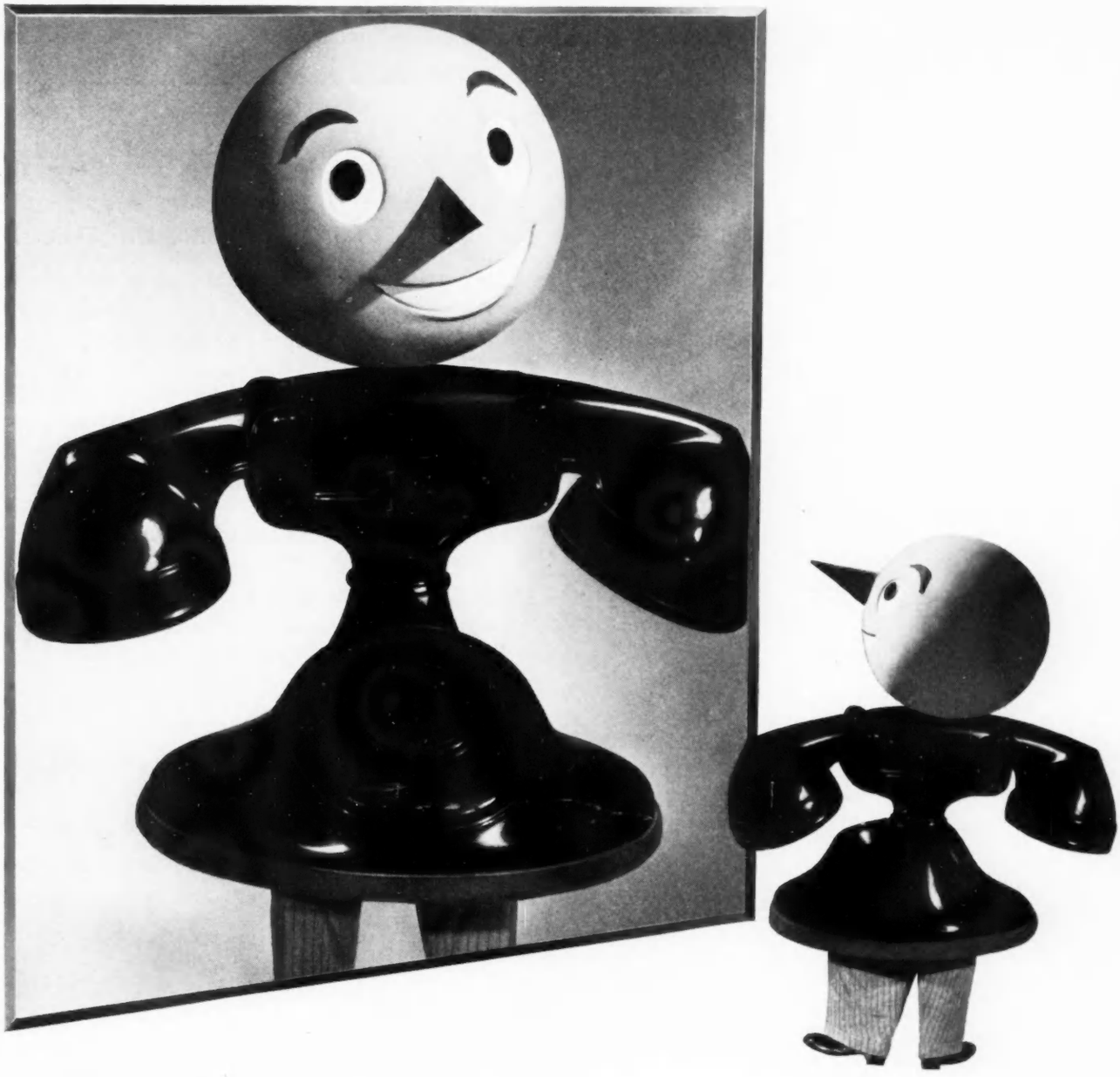
Distributed by AMERICAN AUTOMATIC ELECTRIC SALES CO. · STROMBERG-CARLSON TELEPHONE MFG. CO.

"STILL IN THE LEAD"

The advertisement on the opposite page appears in national magazines during November. • It explains why America needs more telephone facilities now—and can't have them. • It speaks especially of calls "to centers of war activity." • It should serve the best interests of the entire telephone industry.

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

AMERICAN TELEPHONE & TELEGRAPH CO. AND ASSOCIATED COMPANIES
BELL SYSTEM



"If I were twice as big"

"Then I could give the public all the service it wants and take care of the war on top of that.

"But I can't get bigger now because materials are needed for shooting. So I'm asking your help to make the most of what we have.

"Please don't make Long Distance calls to centers of war activity unless they are vital. Leave the wires clear for war traffic."

BELL TELEPHONE SYSTEM

BEACON FIRES WARNED ENGLAND O

Sidonia, Admiral of Spanish Armada, gazes on English coast ablaze with invasion alarm.

SUCH COMMUNICATIONS WERE ADEQUATE TO COPE WITH THE SLOW SHIPS AND SHORT RANGE GUNS OF THE SPANISH ARMADA

IN 1588, when the Spanish Armada was sighted off the shores of England, a series of beacon fires flashed the news along the coast from cape to cape. In those days, such limited means of communication were adequate to spread the warning.

But with today's speedy ships and long range guns, think how disastrous it might prove if an enemy fleet were to get within sight of shore before an alarm was given. Under modern conditions, the chances are that aircraft on patrol duty would spot an enemy fleet while it was still hundreds of miles from shore, and by means of radio give instant warning of the approaching danger. Distant surface craft, submarines, and warplanes would set out immediately to engage the enemy.

Stromberg-C

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION

ND OF APPROACHING ENEMY FLEET

Speedy and dependable communications are playing a part of ever-increasing importance in both defensive and offensive warfare. They are essential to the fast tempo and wide-flung areas of modern war operations.

It is the privilege of Stromberg-Carlson, a company that has specialized in communication equipment for 48 years, to work with our Government in producing the superior communication equipment demanded today. Equipment built by Stromberg-Carlson has already played a distinguished role in our march toward Victory and may be depended upon to serve with even greater distinction.

In telephones, sound systems, and radios . . .
"There is Nothing Finer than a Stromberg-Carlson."

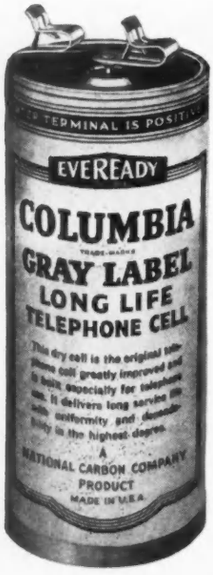
Stromberg-Carlson Telephone Mfg. Co., Factory and General Offices: 100 Carlson Rd., Rochester, N. Y.; Branch Offices: Chicago, Kansas City, San Francisco, Toronto

rg-Carlson

APPARATUS FOR FORTY-EIGHT YEARS

A MEMO FROM A LEADING ENGINEER ON TELEPHONE CELLS!

JAY MITCHELL, consulting engineer and technical writer, says:



"An important contributing factor for providing 'peak' transmission efficiency in magneto telephone systems is to use dry cells which sustain their voltage."

Right, Mr. Mitchell! And when it comes to high sustained voltage, "Eveready" "Columbia" "Gray Label" Long Life telephone cells are tops. For over forty years, these original telephone cells have proved this to men in the telephone industry.

Manufactured to the highest standards . . . constantly improved in the world's largest dry battery laboratory . . . these cells are noted for their sustained voltage . . . long life . . . uniformity of performance. That's why "Eveready" "Columbia" "Gray Label" Long Life telephone cells are used by more independent telephone companies than any other brand. Specify them for transmission efficiency . . . subscriber satisfaction. They are obtainable at leading telephone supply distributors.

"LET'S GO! U.S.A." "KEEP 'EM FLYING!"

★ **SUSTAINED VOLTAGE**

★ **LONGER LIFE** ★ **UNIFORM QUALITY**

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
General Offices: New York, N. Y.
Branches: Chicago and San Francisco

The words "Eveready," "Columbia" and "Gray Label" are registered trade-marks of National Carbon Company, Inc.

EDITORIAL

Save Material! Save Material! Save Material!

Mr. Telephone Man, do you and your employees realize how critical the material situation really is?

Do you know that, as to certain very vital and scarce materials, it is no longer a matter of saving tons or pounds for the war effort, but a matter of saving ounces?

At a recent committee meeting of telephone men in Washington, Mr. Leighton H. Peebles, Chief of the Communications Branch of the War Production Board, told how vital it is that the telephone industry conserve critical materials, so as to make them available for the war effort.

The situation is serious. Telephone Engineer wishes to do its part in impressing that upon every telephone man and woman in the Independent field.

We have permission to quote a part of Mr. Peebles' statements on the occasion named. The quotation follows. It should be reproduced and placed upon the bulletin board of every telephone exchange in the country. Mr. Peebles said:

> **"I should like to make a definite request that all of you spread the word throughout the industry to the greatest degree possible of the critical nature of our material supply. In a measure, I think I have made clear to all of you here how critical our supply is. I could say a great deal more but it would be repetitious. I am regularly kept informed of how critical the situation really is. We know from the cuts that must be made in allotments that it is up to us to save every ounce of material. Get that word around to every man and woman in your employ. Impress upon them that they're saving materials, not for themselves nor the telephone company, but for Uncle Sam. Salvage everything! When it's junk, don't hoard it. It won't do you any good. Get it back in the Nation's stockpile for if it's lying idle, it's not being used to shoot Japs and Nazis."**

Here is one important way by which every telephone man and woman can serve the country—by saving every possible ounce of critical material and thus making it available for use toward victory!

Highlights of the Communications News

Important Communications developments of the past month, briefed for busy readers

by

ROLAND C. DAVIES
Editor, Telecommunications Reports

AMERICAN communications apparatus and equipment in the hands of the Signal Corps troops and on the airplanes and tanks — telephone and radio — proved valuable and integral parts of the Army's invasion of Northern Africa in the spectacular offensive launched by the United States forces, which may mean the turning point of the war against the Axis.

A large portion of the seven hundred million dollars worth of armament and equipment sent to the African front under Lend-Lease through September as reported by President Roosevelt, communications apparatus played a major role in the British advance against the forces of Rommel through Libya. Then, when the American Army staged its sensational offensive, communications became the essential factor in the command of the fast-moving and wide-spread attack.

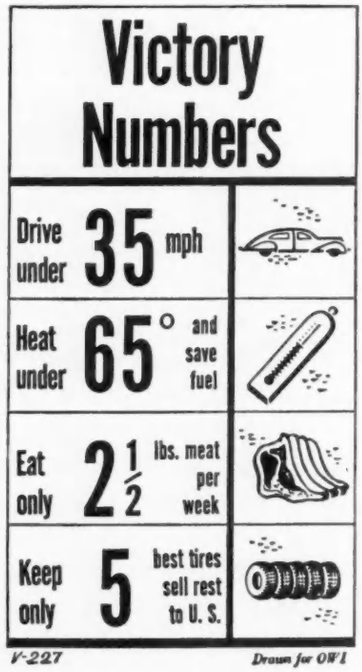
Because the Signal Corps during all this year has been testing and examining the operations of communications equipment in the desert warfare of Libya and Egypt, the apparatus, telephone and radio, which was used in the American African offensive, had been built and geared to meet the conditions of that region. According to all reports in Washington, the communications products of American industry —field telephone sets, field telephone wire and headquarters private branch exchange installations—met the tests of the North African battleground with flying colors.

Inventory Problem

THE increasing scarcity of copper, steel, tin and other strategic materials and metals continued to be a most troublesome "headache" for the telephone industry.

The problem of reducing their inventories to the limitation requirement of 27½ per cent of the corresponding 1940 quarter was the major subject of study of the Telephone Operations Advisory Committee of the WPB Communications Branch at its session Nov. 16. For the Independent telephone industry the inventory situation was understood to be a matter of extreme importance because many Independents still do not have their inventories diminished to the WPB requirements. On the other hand, the Bell System companies were understood to have reduced their inventories well within the specifications of the maintenance and repair order P-130.

Four days previously (Nov. 12), the Communications Branch's Telephone Equipment Manufacturing Committee had held an all-day meeting to consider the best ways and means of handling the excess inventories of the operating companies which were turned back to the manufacturing companies for either scrapping or for redistribution to current telephone construction projects.


Victory Numbers
Drive under 35 mph
Heat under 65° and save fuel
Eat only 2½ lbs. meat per week
Keep only 5 best tires sell rest to U. S.
V-227
Drawn for OWI

Further restrictions of telephone service installations under the L-50 order and similar tightening of telephone manufacturing under L-148 came up for analysis and discussions by the two advisory committees. In regard to inventories one subject that was considered was the significant proposal for the creation of an inventory pool for the Independent industry.

Form New Committees

THE Communications Branch in order to expedite the consideration of problems by its two telephone advisory committees formed in mid-October two Task Committees which study all subjects of interest and prospective phases of their sessions' agenda in advance of committee meetings. The Task Committee of the Operations Committee is composed of J. B. Rees, American Telephone and Telegraph Co., President Harold V. Bozell of the General Telephone Corporation and R. A. Phillips, Vice President and General Manager of the Central Electric & Telephone Co. and 1941 President of the U. S. Independent Telephone Association. The members of the Manufacturing Task Committee are Fred Clarke of Western Electric, President M. K. McGrath of the Kellogg Switchboard and Supply Co. and Vice President J. W. Shipman of Automatic Electric Co.

While further limitations for the telephone industry seemed to be in prospect, there was a continued reiteration by WPB leaders of the policy that telephone service was one of the most essential phases of the war effort and must be maintained at full efficiency.

Manpower Assistance

THE telephone operating and manufacturing industries during the latter part of October received a substantial degree of relief in their man-power problems through the issuance by the Selective Service System national headquarters of two occupational bulletins to local draft boards citing the critical occupations in those two fields. for Copperweld products.

Of the two occupational guides for the draft boards—the critical positions which were difficult to replace and which should be given consideration for six months' deferment—the manufacturing industry received the most liberal treatment by Selective Service headquarters in that a wider range of positions, ranging from the skilled jobs through to the executive and managerial posts, was listed. The operating telephone occupations were practically entirely in the category of skilled work or technicians.

More occupations in the telephone operating field, however, are to be considered by the Selective Service for dissemination to the draft boards. The occupations, formulated by the Board of War Communications for the War Manpower Commission, are now being weighed by the WMC for transmission to Selective Service to be added to the original list of draft board "critical" telephone jobs.

Most important will be the issuance of the Dictionary of Essential Job Definitions by the U. S. Employment Service which will give the draft boards a complete survey of essential occupations in the telephone industry. The War Manpower Commission has also adopted a new technique to determine labor requirements, replacement possibilities, use of women and training expansion—the "manning table" plan. This will mean the listing of all jobs in each company from the standpoint of the type of workers needed, the number of workers required for each type of job, the length of time for replacement of each type of workers and the essential characteristics of the worker in each job. Essential industries, including the telephone industry, will participate in the "manning table" plan, WMC Chairman McNutt announced.

The "critical" jobs in the telephone (operating) industry announced by Selective Service were the following occupations: Cost Accountant; Cable Engineer; Cable Lay-Out Man; Cable Splicer; Cable Tester; Maintenance Carpenter; Central Office Installer; Telephone and Telegraph Combination Man; Professional and Technical Engineer; Electrical Work Foreman; Instrument Maker; Jackboard Operator; Telephone and Telegraph Lineman; Local-Test Deskman; Electrical Maintenance Mechanic; Maintenance Mechanic; Power-house Engineer; Private Branch Exchange Installer; PBX Repairman; Station Installer; Station Repairman; Telephone Inspector; Telephone Plant Powerman; Telephone Station Installation Supervisor; Telephone Switchboard Repairman; Teletype Installer; Teletype Repairman; Testing and Regulating Man; Toll Line Repairman; Toll Office Repairman; and Wire Chief.

In the telephone manufacturing industry, the essential occupations were listed by SSS as follows: Cost Accountant; Assembler (workers who assemble component parts of complicated telephone equipment into complete units); Boring-Machine Operator (all-around); Boring Mill Operator (all-around); Chemist; Coremaker (all-around); Die Maker; Electroplater (all-around); Professional and Technical Engineer; Foremen (foreman actually engaged in supervisory duties and not including straw bosses or laboring gang foremen); Gear Cutter (all-around); Precision Grinder; Gage Inspector; Instrument Maker; Lathe Operator (all-around); Machine Tool Set-up Man; Machinist (all-around); Employment and Personnel Manager; Production Manager; Traffic Manager; Maintenance Mechanic; Melter (all-around); Metal Planer (all-around); Metal Shaper (all-around); Metallurgist; Milling Machine Operator (all-around); Molder (all-around); Patternmaker (all-around); Physicist; Profiling Machine Operator (all-around); Tester and Adjuster; and Tool Maker.

Convention Dates

Missouri Telephone Assoc., Muehlebach Hotel, Kansas City, Nov. 17.

Wage-Hour Division Will Not Count Unattended Dial Exchanges' Stations

THE Wage and Hour Division has ruled that the exemption of the Fair Labor Standards Act for telephone exchanges with less than 500 stations which serve unattended dial exchanges within the same station limitations is applicable and switchboard operators will be considered exempt from the minimum wage and overtime provisions of that law.

This ruling was transmitted by L. Metcalfe Walling, Wage-Hour Administrator, in a recent letter to John H. Agee, Chairman of the U.S. Independent Telephone Association and Vice President and General Manager of the Lincoln, Nebraska, Telephone and Telegraph Co., as a result of the latter's inquiries regarding the unattended dial exchanges' status. Administrator Walling declared that this opinion which was handed down by the office of the Wage-Hour Solicitor will guide the Division in its enforcement policy.

OPA Desirous of Maintaining Existing Regulatory Machinery, Nixon Tells NARUC

STRESSING that the Office of Price Administration desires to adhere to the Congressional policy of preserving the existing Federal and state regulatory machinery, Robert A. Nixon, Director of the OPA Transportation and Public Utilities Division,

(Please turn to page 52)

THANK YOU, MR. MASON!

Dear Ray:

This year for the first time in many seasons I was unable, because of temporary illness, to attend the National Convention of the United States Independent Telephone Association. It goes without saying that this was most disappointing but out of the experience has come a renewed feeling of gratitude and appreciation for the excellent service which TELEPHONE ENGINEER is providing our industry.

Your editorial and pictorial treatment of the convention program has done much to replace for me the actual participation which I would like to have had in the convention events. If it might be so expressed, the October 15th issue relieved me of several degrees of disappointment and while a portion of the atmosphere and fellowship of the convention might still be missing, I certainly have, through reading your magazine, missed little, if any, of the high lights and worthwhile discussions of the program.

For many years it has been consistently true that TELEPHONE ENGINEER has brought needed information and progressive thought to the telephone industry. Each issue supplies some real needs and I want you to be assured that while our positive expressions of satisfaction may be infrequent, our appreciation of your excellent journalism is none the less constant.

Sincerely yours,
C. F. Mason, President
Associated Telephone Company, Ltd.
Santa Monica, California

Wage-Hour Committee of USITA Receives Favorable Ruling

U. S. DEPARTMENT OF LABOR
WAGE AND HOUR DIVISION

OFFICE OF THE ADMINISTRATOR

165 West 46th Street
New York, New York

November 2, 1942.

Mr. J. H. Agee
Chairman
Wage-Hour Committee
United States Independent Telephone
Association
Lincoln, Nebraska

Dear Mr. Agee:

At our conference of October 10, I indicated to you that I would review the problem you presented concerning the applicability of the exemption provided by section 13(a)(11) of the Fair Labor Standards Act to switchboard operators in a public telephone exchange which has less than 500 stations, if those operators also provided switchboard service for dial telephones located in an exchange in another town which also has less than 500 stations.

The Solicitor's Office has advised me that under those circumstances the switchboard operators will be considered exempt from the minimum wage and overtime provisions of the Act under section 13(a)(11). This opinion will guide the Division in its enforcement policy. I assume that it will not be necessary to have a conference on this matter.

Very truly yours,

L. Metcalfe Walling

L. Metcalfe Walling
Administrator

Copy of letter received on ruling that Wage-Hour Division will not count unattended dial exchanges' stations.

A VERY important ruling by Wage-Hour Division Administrator L. Metcalfe Walling has just been announced by John H. Agee, Lincoln, Nebr., Chairman of the Wage-Hour Committee of the United States Independent Telephone Association. We are reproducing the letter received under date of November 2, 1942.

In our October 15 issue, page 56, we reproduced a portion of the report made by Mr. Agee at the National convention in Chicago outlining the question in full. Mr. Agee explained that a memorandum had been issued last July covering the question whether the conversion of a manual exchange to unattended dial service with toll, complaint and information service provided from an adjacent exchange actually resulted the same as consolidating exchanges.

The situation arose in Jackson, Ga. where the manual exchange with 325 stations was converted to dial. Its toll calls and service calls were terminated at McDonough, Ga. a manual exchange with 250 stations. C. J. Denicke, Acting Supervising Director of the Division ruled that the stations should be consolidated, bringing McDonough as an exchange with more than 500 stations and subject to the Wage-Hour Law.

In his report to the National Association, Mr. Agee reported that he had discussed the matter with Mr. Walling in New York and the letter reproduced on this page gives his favorable reply. This action by the Wage-Hour Administrator has superseded the memorandum issued by Mr. Denicke.

The National Association and Mr. Agee are due congratulations on their work in obtaining this clarification.

South Dakota Convention Report

AN eagerness to fully co-operate in the greatest thing in the world—the winning of the war—was the outstanding expression at the thirty-sixth annual convention of the South Dakota Telephone Association held in Mitchell, Oct. 28. In spite of uncertainty, restrictions and rationing, the attendance was nearly up to peacetime numbers.

The same officers and directors were re-elected for the coming year,—President L. P. Ulrich, Woonsocket; vice president, H. R. Burr, Faulkton; and Charles E. Adams, Groton, secretary-treasurer. Directors reelected or serving are, Robert W. Aszmus, Stickney; Ira S. Burnett, Armour; H. R. Burr; Faulkton; F. H. McGinnis, Aberdeen; Gust Quast, Menno; Wm. L. Ramlet, Hurley; H. M. Schumacher, Alexandria; L. P. Ulrich, Woonsocket; and F. E. Wheeler, Scotland.

Two Army Officers brought to the Convention the story of their respective branches of work. 1st Lieutenant Paul W. Hintz, Telephone and Telegraph Section, Communications Branch, Headquarters Seventh Service Command, Omaha, spoke on the relationship of the U. S. Signal Corps to the communications companies. He gave a brief outline of the organization, and how their work fits into the larger army set-up. Lieutenant J. E. Kessel, Headquarters Technical School, Army Air Forces Training Command, Sioux Falls, S. D. spoke of the work of the radio training school and how they trained men fully competent to take their places on ships, on the land, or in the air.

Mr. C. E. Weinhardt, auditor of the Northwestern Bell Telephone Company, Omaha, spoke on the new federal tax bill and how it will effect telephone companies. The need for knowing the provisions of the law, and how to comply with it is very urgent, as the law goes into effect only a few days away, November 1st.

The Hon. J. J. Murphy, chairman of the Public Utilities Commission at Pierre, spoke on the new price regulations and the centralized trend in government. At the end of his forceful address, as Mr. Murphy was retiring from the Commission, it was unanimously voted to enroll him as an honorary member of the association for life, because of his interest in and fairness to all public utilities.

The National association was represented by its Secretary, Chas. C. Deering, of Des Moines, who spoke on the various priority orders and of the need to honestly comply with them in the interests of the common good. Mr. R. A. Phillips, retiring President of the National Association was to have appeared on the program, but was unable to be present, but two substitute speakers were present to assist at the session of "Information Please". Mr. Jay Houghtaling of the Kellogg organization acted as the Clifton Fadiman, and Mr. Deering, Mr. Weinhardt, Mr. Dally and Mr. Newman, as the Franklin P. Adams, and John Kieren of the group. Many questions were asked and much interest shown during this session.

At noon, a complimentary luncheon was given to all members, associates, and visitors by the South Dakota Association.

The Coming Crucial Shortage of Telephone Materials

By E. C. BLOMEYER,

Vice Chairman, National Defense Committee, United States Independent Telephone Association

THERE is impending an acute shortage of many materials and things used for other than direct war purposes. That this situation will affect telephone companies is certain. Compared with it, the shortage of materials we have already experienced will probably be a pleasant dream.

For some time, telephone companies have been having difficulty in obtaining materials, parts and equipment for their customary rate of maintenance, replacement and repair. It seems certain that the impending situation will make it even more difficult to obtain most of these things—some of them, probably, can not be obtained at all. Excepting to the extent that telephone people can, by the use of their ingenuity, maintain their properties without their customary flow of new material, maintenance will likely have to be deferred wherever possible.

Th principal reason for the impending crucial shortage of materials is that our country is, at last, going "all out" for war. There is apparently to be no further temporizing with the question of what shall be done with scarce materials needed for direct war purposes. The answer is that they are going to be used for those war purposes; civilians will get what is left, if any.

In the long run this will be best for all of us, since such a program will undoubtedly hasten our eventual victory. Meanwhile such remnants of "business as usual" that exist—in the telephone business or elsewhere—will be definitely out. We in the telephone industry can best do our part in the prosecution of the war by adjusting our affairs the best way possible, as quickly as possible, to meet the impending situation.

A very definite line of demarcation is now being drawn, by the new "Controlled Materials Plan" of the War Production Board, between scarce materials that can be used for non-war purposes and those that are to be used for war purposes. Under that plan, the amount of such vital key metals as steel, copper, aluminum, zinc, etc., that will be available for non-war uses is relatively exceedingly small.

THERE has been an acute shortage of many vital materials for many months, as we all know. The situation as it was even before the Controlled Materials Plan was introduced, is graphically outlined in a statement made a few weeks ago by Mr. H. O. King, Chief of the Copper Bureau of W. P. B. Mr. King said:

> "We have, as you all know, about 100,000 tons of domestic production of copper a month; 50,000 tons of imports; and we get about 30,000 tons of scrap. That's all the copper we have, and that is on the basis of running all the mines at full capacity, so any loss of production due to manpower shortages or for any other reason is a matter of itself so deadly serious that I don't think any of us could exaggerate it or overstate it. While we have more copper than the Axis powers have, we didn't start arming as early as they did so that today we could use, I should say, almost twice our present supply to meet the requirements of the war effort. I might say that this month and the months to come, 98½% of all the copper that goes into the brass and wire mills and foundries of the country is being used directly and indirectly in the war effort. There is none of it being wasted on non-essential things. All the copper that formerly went into new automobiles and refrigerators and power line extensions and electrical gadgets and all that sort of thing, those are all stopped and there isn't any copper going into any other purpose than a few minor essential repairs, and all the rest the Army, Navy, Maritime Commission and the services are taking over so that when we lose a pound of production in copper, it's just cutting off that many shells and bullets that we are making to kill Japs and Germans with.
>
> "If I use the word copper, I mean copper, lead and zinc and the other things. I am thinking in terms of copper, so I want to clear that phase of it up.
>
> "Zinc is almost as scarce as copper. At the moment, lead is not in as critical a shortage, but as we convert to steel shell cases for small arms and other things and use what available copper we have and increase our small arms output, there is going to be an increasing demand for lead, and I don't believe that in this war we can consider any metal, unless possibly it's gold, that isn't strategic and isn't necessary to the war effort. I have seen too many examples of an analysis of metals six and eight and ten months ago when we thought there was no shortage. My personal opinion is that we are going to need every pound of metal that we can get our hands on, even if we have to take lead slugs to throw at them to fight this whole battle."

During his visit to the recent national telephone convention in Chicago, Mr. L. H. Peebles, Chief of the Communications Branch of W. P. B., stated his concern

over the shortage of materials as affecting telephone companies. Remarks made recently by Mr. Peebles on this matter are quoted on another page of this issue of TELEPHONE ENGINEER.

RUMBLINGS of the coming crucial shortage of things used in the telephone business—and particularly things used for civilian telephone service—have been heard for some time past. The manufacture of telephone instruments, excepting those for special war purposes, is being stopped. Rigid inventory controls are to be applied to practically all businesses. There is under contemplation a "stockpile" plan under which all inventory, or at least all inventory in excess of provable needs, would be pooled for the use of all companies.

Additional to these and other things, the War Production Board announced on November 2nd an entirely new plan of dealing with the distribution of materials; the "Controlled Materials Plan".

Basically, this plan works just the opposite of the plans that have been in use in the past for the distribution of materials. Heretofore there was first decided what was to be done, or to be manufactured; then everybody scurried around to find and get, if they could, the materials with which to do it. Under C. M. P. there is first determined the amount of materials available with which to do anything; then those materials are allotted to the agencies of the Government that have the right to determine what use will be made of them; then those agencies decide what is to be done with those materials.

THERE are seven "claimant agencies" entitled to participate in the use of the available material—The Army, Navy, Maritime Commission, Aircraft Scheduling Unit, Lend-Lease, Board of Economic Warfare (for civil exports) and the Office of Civilian Supply. The last named is the agency which obtains the allotment of material to be used for civilian purposes, and will presumably also be the agency to allot the materials that can be used for the maintenance of the telephone systems.

As a measure of what civilians can expect, Mr. Leon Henderson, head of the Office of Civilian Supply, has been quoted in the press as saying that only 1½% of the country's steel production and about ¾ of 1% of all the copper, will be available for civilian use. It is not clear at the moment whether the amount of these materials necessary for the maintenance of the very vital communication systems of the country must come out of that allotted to strictly civilian use, but it hardly seems possible that all material needed for the maintenance of communications could or would be considered as used for civilian purposes, since a large percentage of the use of the telephone, for instance, is today for essential war purposes. This is one of the things about C. M. P. that we will have to learn as the plan is made public in all its details.

If Mr. Henderson's figures can be taken as a criterion—and they no doubt can—of the amount of all critical materials that will be available for strictly civilian use, no great amount of imagination is required to appreciate the effect this plan will have upon the civilian use of many things, including civilian telephone service.

C. M. P. will be put into operation gradually, with the expectation that it will be fully effective by July 1, 1943. To begin with the plan will apply only to three important materials—carbon and alloy steel, copper and aluminum.

As C. M. P. becomes effective the old plans—"allocations", "Production Requirements Plan", etc.,—go out or become a subsidiary part of C. M. P. Even "priorities" will be out, in the sense that we have known them. Preference ratings will continue to be used, but they will be used only for deliveries of materials other than controlled materials. Allotment numbers will be used for procuring controlled materials. These numbers indicate the agency for which the product is to be manufactured, the program under which the material is allotted, the authorized schedule of production, and the month in which the controlled material is to be delivered.

C. M. P. apparently works this way: Assume that the Army, for instance, is allocated a certain amount of each of a number of critical materials. The Army can then itself determine the use it is going to make of those materials. Assume that it decides to use a certain amount of the materials for the manufacture of tanks.

The Army will then allot the necessary amount of the materials to the manufacture of tanks. The tank manufacturer can then be certain that he will get the materials he needs in order to manufacture those tanks. He will not need, any more, to go out and fight and scramble to get the material—the order given him assures him that the material will be available to him for the specific purpose named.

If the tank manufacturer uses subcontractors, then he will have to assign to each of them the necessary portion of his allotment of materials assured to him for the manufacture of the tanks.

THE foregoing is rather sketchy, of course, but the space for this article does not make it possible to describe the C. M. P. in further detail. Undoubtedly the new system will be fully described in the telephone trade press and elsewhere, in due time.

The foregoing will be sufficient, however, to make it clear that none of the controlled material will be allotted to telephone companies, at least directly, excepting material allotted to them through the Office of Civilian Supply for maintenance and civilian purposes.

Obviously, when material is to be used to build, for instance, a telephone exchange for an Army camp, that material will have to come out of the controlled material that has been allotted, in this case, to the Army. Apparently, if the Army camp telephone exchange is to be built by and owned by a telephone company—as is the case with many such exchanges now—the Army will have to allot, from its own supply of material, the controlled material necessary to build that exchange, which will include the controlled material necessary to manufacture the equipment and other manufactured things that are used in building that exchange.

Information made public to date re-

(Please turn to page 39)

WANTED—YOUR IDEAS!

As the Treasury Department's special six weeks' War Bond Payroll Savings Campaign progresses from November 15th to New Year's Day, the War Savings Staff is anxious to secure as many ideas as possible on how different companies are planning to put across their individual drives for 10% of payroll.

These ideas in turn will be passed on to other companies to aid them in reaching the mutual objective before New Year's Day.

The continued success of the War Savings Campaign depends on the Payroll Savings Plan, which has proved the most effective means of insuring the systematic purchase of War Bonds by millions of workers. Consequently, the War Savings Staff is trying to complete the job of signing up every wage earner for 10% through the Payroll Savings Plan not later than the first day of 1943.

Help the national campaign, first by putting over the drive in your own company, and then by telling the War Savings Staff how you did it. Send this vital information to Payroll Savings Division, War Savings Staff, Treasury Department, 709 12th Street, N. W., Washington, D. C.

Wire Chief's TRAINING COURSE

Miscellaneous Notes on Cable Construction

Sec. XX

(Prepared Expressly for TELEPHONE ENGINEER by the Lincoln Engineering School)

Bonding and Grounding

THE term **bond** as applied to cable refers to the connection of several cables together by means of bonding ribbon, or the connection of the cable sheath to the messenger in aerial cable construction. The primary purpose of a bond is to provide a low resistance electrical path between the items connected together so that there will be no potential difference between them, or in the event a voltage difference does arise that the interchange of current that takes place will pass through the low resistance bonding ribbon and not through other paths that might damage the cable sheath.

In underground cable construction it is considered standard practice to bond all cable sheaths together at every manhole. This places all sheaths at the same potential and minimizes the tendency for current to flow between the sheaths which might result in electrolysis damage to the cable sheath.

At terminating points such as the central office mainframe the entering underground cables should be bonded together and connected to a low resistance ground. In most cases the cables are connected to the central office ground. Fig. 1 illustrates the use of bonds in underground cables.

Use of Insulating Joints

IT is sometimes necessary to electrically isolate the sheaths of aerial and underground cables, or in some cases the sheath of a cable entering a building. This is accomplished by placing what is known as an **insulating joint.** These joints consist merely of a break in the continuity of the sheath and this opening is closed against the entrance of moisture by means of several layers of rubber and friction tape in the case of joints not exposed to the weather, and with a sleeve of the wiped type which is insulated on one end where the insulating joint is exposed to the weather.

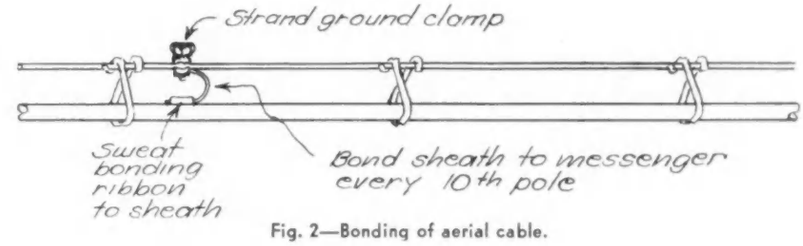


Fig. 2—Bonding of aerial cable.

Insulating joints have been more frequently used in the past than at present. A typical example of the use of an insulating joint would be the isolation of an aerial cable with a severe exposure to high voltage power wires and which connects to an extensive building cable system. An insulating joint placed at the building entrance would reduce possible hazards in the event the telephone cable became crossed with the high voltage power wires.

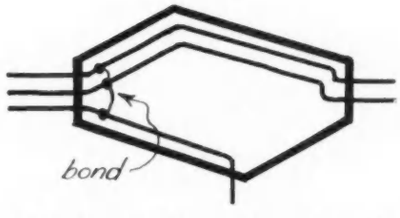


Fig. 1—Use of bonds on underground cables

Insulating joints may also be required where underground cables enter a building and where it is necessary to electrically isolate the sheath from ground for electrolysis reasons.

In some cases it may be found that the connection of an aerial and underground cable sheath will result in inductive noise. In such cases an insulating joint may be required. However it is seldom that this is true, and aerial and underground sheaths should always be connected together unless there is some good reason for not doing so.

Bonding and Grounding Of Aerial Cable

WHERE aerial cable is carried in rings it is standard practice to bond the cable sheath to the supporting strand at or near the end poles of each section of cable and at about every tenth pole in between as shown in Fig. 2. This is accomplished by sweating a bonding ribbon to the sheath and bolting it to the supporting strand. The purpose is to prevent sheath damage due to arcing at the rings in the event of a cross with a

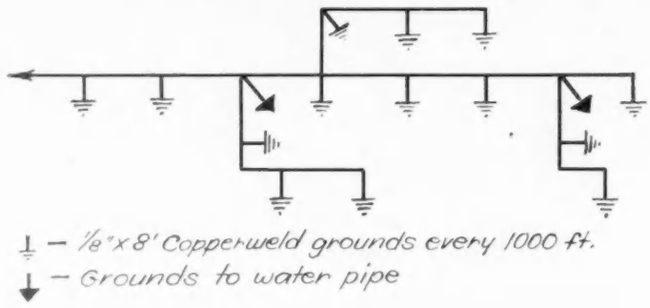


Fig. 3—Grounding plan for cable system.

high voltage power line.

Where cable is suspended by the **spinner method** bonding is thought to be unnecessary as the more intimate contact between the sheath and messenger offers a good low resistance path for an interchange of current and prevents arcing.

The frequency with which aerial cable should be grounded will depend largely upon the degree of exposure to high voltage power lines carried on the same pole line. In general where only relatively low voltage power wires are involved no extra consideration need be given the grounding of aerial cable, other than to make sure that the office end is connected to a good low resistance ground preferably the water mains. Grounds should of course be placed at every protected terminal and these will in effect ground the sheath.

Where a cable is involved with an extensive joint use pole line carrying power wires with voltages higher than 5000 volts it is essential that the cable sheath be maintained at a low resistance to ground. This can be accomplished by placing grounds, consisting of ½" x 8' copperweld electrodes and connected to the cable sheath with No. 6 (B & S) bare copperweld wire, approximately every 1000 feet. In addition the sheath and messenger should be connected to a low resistance ground at the central office and to the water mains at other locations if possible. This grounding plan is illustrated in Fig. 3.

The theory back of the extensive grounding of a cable system exposed to primaries whose voltage is greater than 5000 volts is that in the event of a cross the low impedance path to ground will carry sufficient current to blow the power protective fuses or breakers and thus open the power source and prevent damage to telephone apparatus or possible injury to subscribers. It is especially important that extra protection be provided above 5000 volts due to the limitations of substation protectors to approximately this voltage. Protectors are not reliable at voltage in excess of 5000 volts and might fail to open the line.

Cables Under Gas Pressure

THE Bell System are now making extensive use of cables maintained under gas pressure. Up to the present only toll cables are operated in this manner.

There are two ways in which gas under pressure can be used in a cable plant, viz: (1)—To test for sheath openings. (2)—To keep a cable constantly under gas pressure for the dual purpose of preventing the entrance of moisture in the event of a sheath opening and to operate an alarm so that the trouble can be repaired before service interruption results.

Nitrogen gas is in general use for pressure testing work and has the special merit of having a drying effect. In some cases it is possible to restore service in wet cable by admitting nitrogen gas to the cable. This is particularly effective with the smaller size cables and where the gas is admitted to a relatively short section of cable and close to the point at which moisture has entered the cable.

On toll cables which are maintained under gas pressure, the cable is divided into sections, and a separate gas source maintained for each section. At fixed intervals along the cable a valve is provided to which a pressure gauge can be connected. At these points a pressure contacting mechanism which will close an alarm circuit when the pressure falls below some set value is also provided.

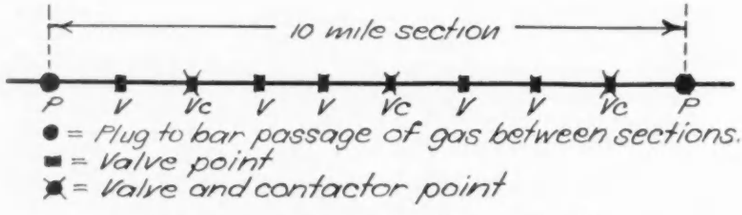


Fig. 4—Gas pressure toll cable section arrangement.

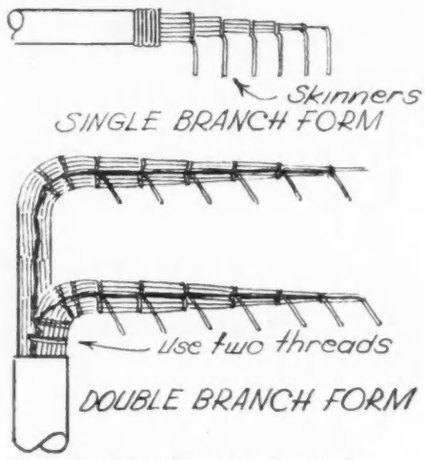


Fig. 5—Single and multiple branch forms.

When a sheath break occurs the gas leaking out of the effected section causes the contractor to operate and this closes the circuit of a special alarm pair carried through the cable and which connects to all contactors. This pair, which terminates in an office at some point along the line, can then be measured (loop resistance) to determine the approximate location of the section in which the sheath break has occurred. A trouble man dispatched to this point takes measurements of the gas pressure at several valve points in this vicinity and from the readings obtained is able to determine approximately the location of the faults. Where the toll cable is of the buried type the pressure valve is brought up on a stub pole so as to be readily accessible. The pressure contactor is also mounted with the test valve.

Pressure readings are plotted from a series of gauge readings to indicate the approximate location of a sheath opening.

Isolated cable sections are generally 10 or more miles in length. At the junction or adjacent sections it is necessary to place **plugs** which are for the purpose of isolating the gas in one section of cable from that in an adjacent section. This is accomplished by removing the sheath for a distance of about 12" and ballooning the core and then thoroughly impregnating with a special compound. A sleeve is then placed over this opening and after being wiped up in the normal manner the sleeve is then filled with an asphaltic compound. These plugs if properly made are sufficiently tight to prevent the escape of gas from one section to another.

Plugs are also required at terminating points i.e., where gas filled cable connects to a main frame. Fig. 4

(Please turn to page 57)

Conservation of Telephone Plant

By B. C. BURDEN

Transmission Engineer—L. T. & T. Co.
Lincoln, Nebr.

General

IN the first part of this article, which appeared in the October issue, the urgent need for conserving every possible pound of critical materials was stressed. Since October the critical materials situation has not improved and, if anything, is worse, hence there is greater need than ever for getting the maximum life out of existing telephone plant. Let us consider the principal items of outside plant which a proper maintenance program should take into account.

Outside Plant Inspection

THE periodic inspection of outside plant as a means of detecting sources of excessive wear was a good practice before Pearl Harbor and now it should be a "must" for every exchange.

These periodic inspections should disclose sources of abnormal wear and by promptly applying corrective measures the damage will not progress to the point where replacement is necessary.

The inspection can best be made by either walking or driving over the outside plant and making notes on all work items necessary to correct conditions likely to cause abnormal wear. If the plant is small it may be more convenient to inspect and make repairs at the same time.

Typical of the items that can be picked up on an inspection of outside plant, are:

1.—Broken or badly rotted poles—It is particularly important that poles that support an aerial cable be replaced or stubbed promptly if they are broken off as a pole swinging in the wind is a sure way to ruin two spans of cable since ring cutting progresses rapidly under this condition. A lead which is weakened due to a few rotted or broken off poles may go down in a heavy storm, resulting in extensive damage and the use of substantial quantities of critical material which could have been avoided by a proper preventative maintenance program. If poles are not available and if ground clearance is sufficient the line strength should be restored by merely resetting the existing poles.

2.—Line wires which have excessive sag should be pulled up to proper tension otherwise they are sources of line trouble requiring man power, gasoline, and rubber to restore service. Floating insulators, loose tie wires, etc. are all sources of line trouble and should be corrected.

3.—One of the chief sources of abnormally short life of telephone plant is inadequate tree clearance. Trees should be trimmed so they do not contact drops, cable, or open wire. Failure to provide adequate clearance means certain damage to cable sheath, or drop wire, as well as service interruption.

4.—Special attention should be given to the maintenance of cable plant. Points that should be checked in inspecting cable plant are: (a)—Replace missing rings. (b)—Check and repair sleeve supports. (c)—Check terminal legs to insure that they are properly attached to the pole, have proper slack and impose no strain on the cable leg where it comes out of the sleeve. (d)—Inspect the cable support at all corners to insure that there is ade-

Technical Editor Accepts Washington Appointment

B. C. Burden, technical editor of TELEPHONE ENGINEER magazine has accepted an important position with the Communications Branch of the War Production Board and moved to Washington on October 12th. The new position, which carries the title of Senior Communication Specialist, will keep Mr. Burden in Washington for some time, however, he will still retain his connection with the Lincoln Telephone and Telegraph Company of Lincoln, Nebraska, being merely on loan to the government by that company.

His work with the Communication Branch of the War Production Board will consist of engineering analysis of L-50 appeals and preference rating applications. This branch of WPB is under the direction of Leighton H. Peebles. The telephone section is headed up by Bruce H. McCurdy.

Mr. Burden's wide and varied experience in the telephone field should prove of value in his work. Prior to accepting the assignment with WPB he was resident engineer in charge of design and construction of an extensive telephone system installed by the Lincoln Telephone and Telegraph Company at the Nebraska Ordnance Plant at Mead, Nebraska. In addition to his many articles on telephone subjects Mr. Burden operates the Lincoln Engineering School which has enrolled, since its inception in 1937, over 3000 students.

He will continue to serve as technical editor of TELEPHONE ENGINEER.

quate slack and that the cable is not ring cutting.

Worn and badly ring cut places in the sheath can be temporarily repaired by applying two layers of friction tape —A repair of this type will last for several years without much danger of moisture getting into the conductors.

Repairing Defective Line Wire

IT is, of course, important that telephone companies continue to render adequate service. There is now need however, of thinking more in terms of **expedients** and **repair** rather than simply replacing an item of plant that is giving trouble. For example, in connection with iron wire circuits which are giving service trouble due to high resistance connections the simple remedy would be to replace the worn and rusty wire with new, but with every pound of steel urgently needed for military purposes it is imperative that replacement be resorted to only if there is no other way out. It is seldom that iron wire is encountered which is so badly rusted that it cannot be repaired so as to extend its life.

It is only when iron wire is so badly rusted as to have deep pits that repair is impracticable. Iron wire seems to "wear out" long before it actually does due to high resistance connections. A survey made on a large number of rural iron wire lines showed that many of the lines had quadrupled their resistance in 20 years. Naturally, with the modern compression type sleeve, future experience with iron wire lines spliced by this method should show improved characteristics. This tendency of the older rural lines to show increased resistance and consequent transmission and signalling trouble with age is due almost entirely to bad connections. While double tube sleeves are considered a good splicing method oftentimes, during the repair of extensive damage from storms inexperienced help are used and sleeves are placed without adequately burnishing the line wire, with the result that a high resistance connection is created.

Rehabilitation of Iron Wire Lines

LINE wire which has become almost unserviceable because of poor connections can be restored to workable condition by making "mile by mile" checks of loop resistance. These tests, which the writer has described before in this magazine, require only a portable ohmmeter and one condenser, plus two men to make the tests. The condenser is placed in series with one of the line wires on the main frame jumper. This is for the purpose of isolating the C. O. drop from the line so that signalling and talking currents can pass from the C. O. to the line but at the same time the D.C. ohmmeter testing current is blocked thus the readings obtained are not thrown in error by the fact that the C.O. drop is bridged across the line under measurement. If the signalling system employed is one which has the drop connected from one side of the line to ground the condenser will not be needed. A 4 M. F. condenser should be used. If this size is not available use four 1 m. f. condensers in parallel.

The object of the mile check is to locate sections of line whose resistance is substantially higher than normal. No. 109 (No. 12 B.W.G.) iron wire should show a resistance of about 64 ohms per loop mile. Wire which shows much in excess of 75 ohms per loop mile should be suspected as having one or more bad splices and will need to be sectionalized and each section tested to locate the defective connection.

The testing procedure is as follows: Starting at the cable terminal into which a rural line may feed the lineman attaches his test telephone to the pair under test and sends his helper down the road to the end of the first mile. When the helper is ready to apply a short he goes across the line with his test telephone and so advises the lineman who proceeds to measure the loop resistance. If the test shows o.k. the helper then moves ahead to the end of the next mile where the test is repeated. A record of the reading of each mile must be kept so that the true reading of the mile under measurement can be determined. It will be necessary for the lineman to move to a new testing location if more than one or two phones (1600 ohm type) exist between the point at which the short is applied and the location of the ohmmeter. Bridged telephones have the effect of making the reading appear lower than the actual resistance of the loop under measurement. The most accurate readings will be obtained if measurements are confined to single mile sections. One bridged 1600 ohm telephone located close to the tester will on a one mile measurement reduce the normal reading by about 4 ohms.

Defective splices should, of course, be cut out and replaced with the new type compression sleeve, or if tools for applying these sleeves are not available then the standard double tube sleeve should be used. Needless to say, the line wire should be properly burnished. If sufficient slack is not available to permit cutting out the existing splice without cutting in a small section of wire then the long type repair sleeve which is available for the compression type sleeve should be used.

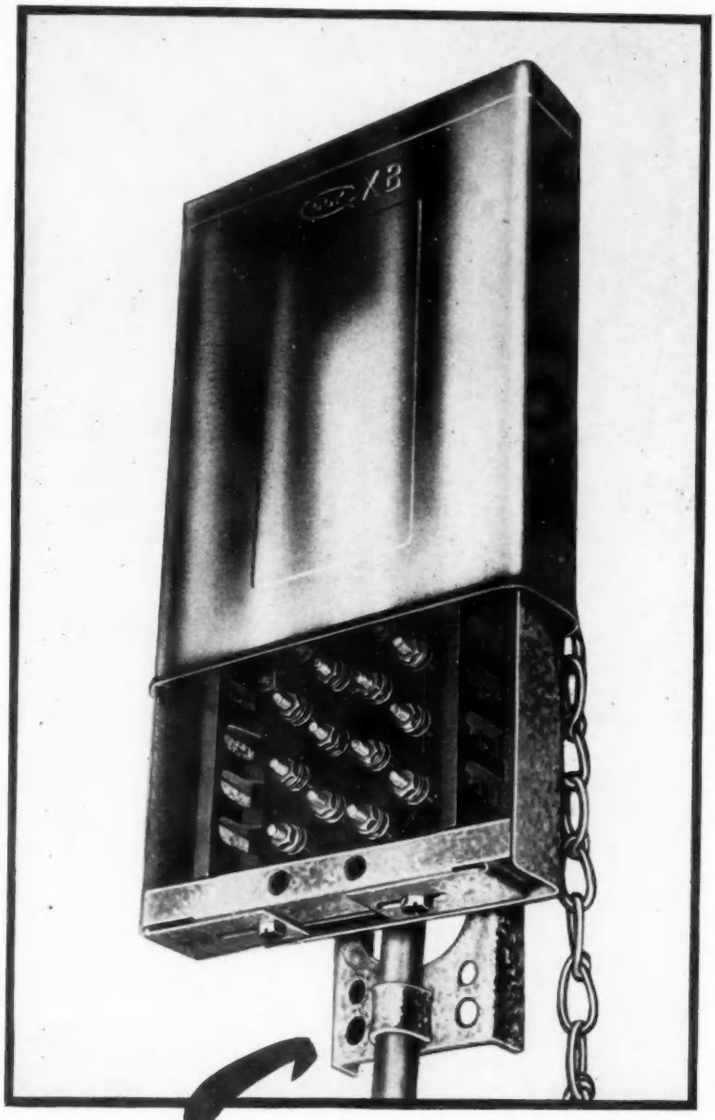
Replacements and Additions to Plant

IN considering replacements or additions which can qualify for priority assistance under W.P.B. regulation, careful consideration should be given to expedients that may obviate the proposal without adverse effect on telephone service. For example, assume a section of cable may have been severely damaged by lightning and a number of pairs lost so that not enough pairs are available for the load carried. If temporary repairs of the sheath damage could be made and if it was possible by a more advantageous grouping of party line subscribers to get by with the existing cable then this plan should be followed. The extent to which a telephone company should go in order to eliminate the need for new material would depend on the magnitude of the material requirements for a particular job.

The many new defense plants under construction as well as additions to existing plants have created the need for substantial amounts of P.B.X. telephone facilities. There is no question but that these facilities are vitally needed by the war effort, however, in the interests of conserving critical materials as much as possible for direct military applications, care should be taken in engineering P.B.X. facilities. The fact that the plant may be an important unit in the defense picture does not justify an extravagant use of equipment and the telephone company should not hesitate to advise the customer of how maximum use can be made of existing facilities and in helping keep new requirements down to a minimum basis. In this direction, suggestions that more bridged telephones (rather than additional line equipment) be used, that business telephones be limited to business calls only and the substantial number of personal calls carried by every P.B.X. system be either reduced or entirely eliminated for the duration are not out of order.

Opens New Camp As Development Laboratory

Major General Roger B. Colton, Chief of the Signal Supply Services, together with Brigadier Generals G. L. Van Duesen and Edgar L. Clewell, recently opened Camp Coles, a new subpost of Fort Monmouth, which will house a division of the Signal Corps General Development Laboratory to be staffed by civilian employees.



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Make test pole connections

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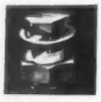

Copper (2) washer

Iron (1) washer

Iron (2) washer

Iron to copper

CONNECT an arm of open wire to cable—make a right angle corner or test pole connections — make other electrical connections without the use and hazards of hot solder. . . . Kearney Con-Nec-Tites have patented full round washers —special threads that prevent binding or cross-threading of nuts — and suitable materials to provide high conductivity. They're the choice of scores of operating men who have used these modern Con-Nec-Tites for years. You, too, will profit from these advantages that Kearney Con-Nec-Tites afford — at no greater cost.

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TELEPHONE ACCESSORIES

Protect All Telephone Plants!!

TELEPHONE ENGINEER considers it a pleasure to cooperate with the United States Independent Telephone Association and the Army Signal Corps in reproducing their Bulletin of January 8 on the subject of protection of telephone plants during war-time. The Signal Corps is anxious that the Bulletin be again brought to the attention of the industry hence our reproduction of the original order in this issue.

FOREWORD

OUR country is at war. Telephone service, both local and long distance, is vital to the safety, defense and morale of the nation. It is up to telephone people to do everything they can to protect this service. Some of the things we must consider in that connection are the possibilities of sabotage and—in at least certain parts of the country—enemy action.

Do not consider any telephone exchange too small or too unimportant to be safeguarded. The most important telephone call of a year might be possibly from some small, isolated exchange!

It is the duty of this Association to give you certain suggestions and advice about these matters. In presenting this, we have had the benefit of advice from the Army and from large telephone companies, both Independent and Bell. PLEASE READ AND HEED THIS! It may be very important to you at any moment!

You must, of course, yourself, judge what your own conditions and location require to be done. Naturally a large, strategically located exchange, in a defense area and near a coast line, will feel the necessity of greater precautions than a small exchange outside of any defense area and in the interior. But, wherever you are, we hope you will OVERDO, rather than underdo, your precautions.

The following is taken from the things that some companies have done and are doing:

(1) Ascertain, if you do not already know, the citizenship and national allegiance of every employe. Put every trust in loyal Americans, **but take no chances with fifth columnists.** Our country is at war.

(2) Instruct and impress upon employes that telephone conversations—civilian or otherwise, **must** be secret. There are already laws, with severe penalties, for violating this. Post notices on your bulletin boards calling attention to this and to these laws.

(3) Instruct and impress upon employes that they **must not** talk about the business and affairs of the telephone company, including particularly its plant extensions or plans for them and the demand upon it for additional services. This applies 110% to extensions for defense service of any kind. The recipient of such news may be perfectly loyal, but may, nevertheless, innocently pass it on to a place where it will be harmful to the defense of this country.

(4) Bar strangers from entering those parts of your buildings or plants not ordinarily open to the public.

TAKE NOTICE: On August 21, 1941, the Defense Communications Board in Washington adopted a resolution requesting all persons engaged in the communications industry to take

(Please turn to page 38)

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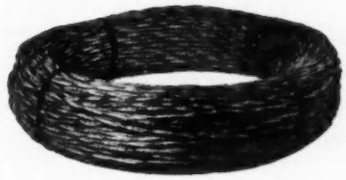

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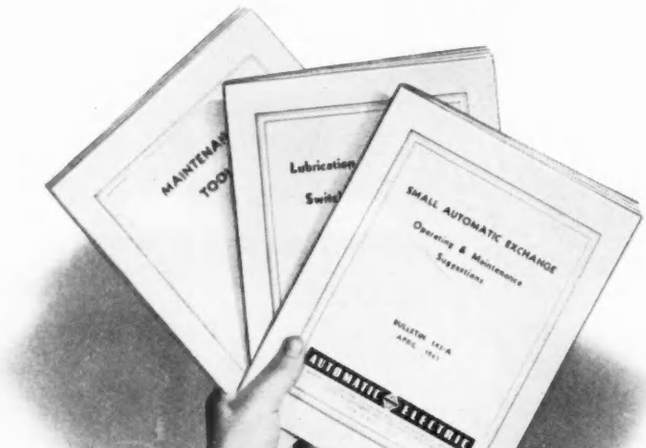
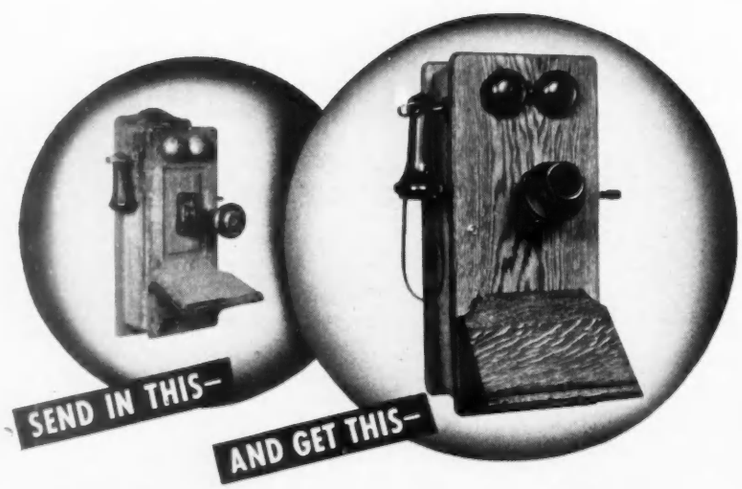


A proper program of maintenance will help preserve your present equipment and maintain service standards at a high level. We will gladly provide complete instructions for the correct care of the equipment used in your exchange.



Our "AR" Rebuilding Service reconstructs old or obsolescent equipment from the ground up, using factory methods and trained craftsmen. The finished products look like new and perform like new!

Telephone men today face a difficult t—that standards with such equipment as they have, with maintenance, repair and operation. This means t ever your present equipment in top operating condit for th

But this task need not be yours alone. So fa we c too. For this reason we are prepared to offer a riety meet wartime conditions.

For example, we can help you establish a nd, o using standard routines which are designed to s troub service. Our recommendations are based on ext ive st exchanges of all kinds at high operating efficienc We'll

Or, when equipment of any kind wears o you c "rebuild and return" service. You will be surp d at efficiency which a regular rebuilding program acco recommendations?

These are only two of the many specific ices w Others are listed briefly at the right. We urge t you or submit your problems to us direct. We'll he in eve

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5. ***Operating Advice***—our operating engineers are available for consultation on operating problems.
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7. ***Emergency Equipment***—if disaster strikes, ask us to help you obtain temporary facilities.
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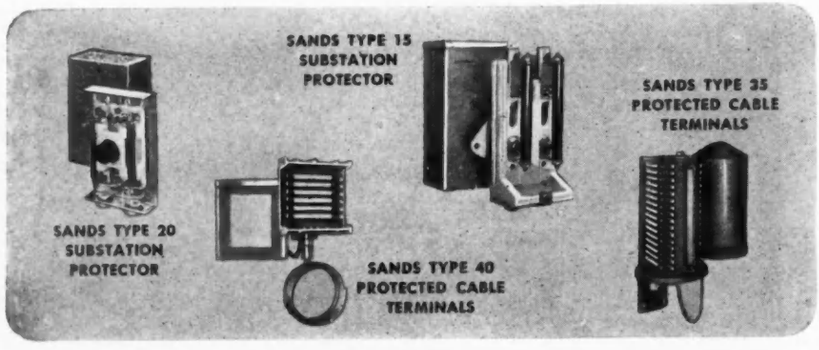
THE SANDS standard of protection is tops. It is literally impossible to buy any better protection—anywhere! For one thing Sands protective devices are engineered to provide maximum protection against destructive forces. The rugged metal cases are strongly constructed and finished to withstand the worst that time and weather can bring. Mounting facilities are always convenient. These and other features are carefully considered, worked out and tested to give you extra durability and extra strength for longer service.

In all, Sands protective apparatus sets a standard of greater protection and, consequently, greater economy for the telephone industry. For complete information write for Catalog 4068-A.


SANDS TYPE 15 SUBSTATION PROTECTOR
SANDS TYPE 35 PROTECTED CABLE TERMINALS
SANDS TYPE 20 SUBSTATION PROTECTOR
SANDS TYPE 40 PROTECTED CABLE TERMINALS

AUTOMATIC ELECTRIC

ORIGINATORS AND DEVELOPERS OF STROWGER STEP-BY-STEP MACHINE SWITCHING AUTOMATIC DIAL SYSTEMS

MAKERS OF TELEPHONE, SIGNALING AND COMMUNICATION APPARATUS
ELECTRICAL ENGINEERS, DESIGNERS AND CONSULTANTS

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Export Distributors: AUTOMATIC ELECTRIC SALES COMPANY, LIMITED

LETTERS

(Continued from page 12)

for the sum of eleven dollars and fifty cents ($11.50) which we got a long while ago, but which we did not send before, waiting to see if the mail delivery got somehow reestablished. Now that we are getting ship mail again, kindly use the enclosed eleven fifty for the following worthy purposes:

Send us one new edition of Standard Handbook for Electrical Engineers	$8.00
Put us down for an additional two year subscription to magazine.....	2.50
Just hold down for extra postage, or in case you want to write giving me hell by airmail, so you wouldn't have to draw out of the funds you have reserved for the platter of the Presbyterian Church	1.00
Total	$11.50

In view of the fact that getting a money order at present in this country involves a long process of applications, explanations, re-applications, and the signature of half a dozen individuals, I wish that the amount enclosed will be sufficient, and if not that you will let me know of any small difference by airmail at once sending the stuff along anyway, and trusting that you will get the difference some day; which you will, since as I said before, I spend day and night worrying about the financial stability of TELEPHONE ENGINEER Publishing Corporation

In case all this gives you a headache, just go across the street and order an Alka-Zelzer, sending me the bill for that, too.

Most sincerely yours,
Rafael W. Keith
Box K
San Jose, Costa Rica

(Ed. Note: Reader Keith almost wrote a book himself.)

◆

Dear Mr. Smith:

I offer no other explanation than that of an oversight on my part for not telling you how much I enjoyed reading your magazine for the past several months. It's so interesting—I can hardly wait for the postman to deliver the next issue. Being associated with telephone work your magazine has been very beneficial to me. I have informed many of my friends about it.

In the near future I shall take every advantage of what the TELEPHONE ENGINEER has to offer in regard to questions and answers.

May I say once again that TELEPHONE ENGINEER rates among the first of my favorite magazines.

Sincerely yours,
Walter Wilus
360 David Street
South Amboy, New Jersey

25 YEARS AGO THIS MONTH

Taken from TELEPHONE ENGINEER files of November, 1917.

TWENTY-FIVE years ago the columns of TELEPHONE ENGINEER reported that information received at the offices of the American Telephone and Telegraph Company stated that General Pershing's headquarters in France had been connected with all encampments and training quarters of the American army by a telephone system constructed by Americans. All materials except poles were shipped from this side. The rapidity and accuracy with which the Americans installed four telephone lines to Paris amazed their French cousins—within five minutes after the orders were issued the men were at work on the job.

★

Two signal corps companies were to represent the Ohio Independent telephone industry in the French trenches within a few months. These two companies were raised by the association officials, and included a number of former Cleveland telephone men. (History is repeating in World War II. See article on Ohio association this issue.)

★

Particular interest was attached to the demonstration of a wireless telephone, (25 years ago) not only because it was the first time the apparatus had been used in public, but because it was to be part of the equipment of the base hospital to be operated on the French front. With the use of the invention it was possible to furnish music to the individual patient and nurses were able to read newspapers and stories to several hundred patients at the same time.

★

It was reported in the Nov. 15, 1917 TELEPHONE ENGINEER that, as a concession to Americans, English was allowed to be spoken over the telephone in Paris. It was suggested that this would also save the wear on the instrument that would be caused by the American effort to talk French.

★

In November, 1917, San Fransisco papers announced the invention of a new device for the clear transmission of the voice over practically unlimited distances of surface wires or submarine cables. By means of the new device, it was stated both sides of the world might be brought into telephonic communication.

YOUR GRAYBAR MAN CAN HELP YOU MEET THIS "SQUEEZE!"

Today, the *first job* of your Graybar Man is to help you meet essential service needs in spite of scarcities of materials and manpower. Here are some of the things he can do:

AID ON WHAT TO ORDER...GRAYBAR Men keep well informed on delivery conditions. They can often suggest practical substitutes for unavailable items, and can expedite inquiries concerning scarce supplies.

TIME-SAVING ORDER PROCEDURE . . . GRAYBAR Men try to keep up-to-the-minute on priority rules, avoiding needless "red tape" in getting goods to which you are entitled. Because one man – one order blank – brings *all* the supplies you need, ordering and billing are simplified.

INDIVIDUALIZED, LOCAL SERVICE . . . Once a GRAYBAR Man starts working with you, his knowledge of your special needs and delivery requirements cuts down the time you must devote to detailed specifications and instructions. The GRAYBAR warehouse serves as *your* warehouse, and the GRAYBAR trucks deliver available supplies *where* you want them *when* you want them.

. . .

If your office and stockroom is shorthanded, why not sit down now with your GRAYBAR Representative and work out a "short-cut plan" for ordering, billing and delivery of your 1943 supply needs.

GraybaR

Everything Electrical . . . . THAT IT TAKES TO WIN!

IN OVER 80 PRINCIPAL CITIES

Executive Offices: **GRAYBAR BUILDING, NEW YORK, N. Y.**

Conducted by B. C. BURDEN, Technical Editor

Line AND Desk

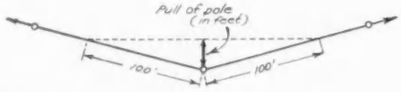


Fig. 1-B—Illustration of term "Pull" as applied to pole lines.

Q. Please define the term PULL which is used in determining anchorage requirements at bends or corners in the line.

A. In general, the term **pull,** refers to the magnitude of the deviation from a straight line which an aerial wire lead makes at a bend in the line. It is measured as shown in Fig. 1-B. The **pull** in feet is determined by measuring a distance of 100 feet along the lead in each direction from the corner poles, and then laying out a straight line between the two measured points. The **pull** is expressed in feet measured from the nearest point of the straight line to the corner pole.

To determine the guy strength required to hold the strain use the following formula:

$$S = 2K \frac{pull}{100} TNG$$

Where: S=strength of guy required
K=desired factor of safety
T=maximum working tension in each line conductor
N=the number of conductors
pull=distance in feet as explained above
G=a factor obtained by dividing the heighth by the lead of the anchor which will be used.

Q. In measuring vertical code clearance between open telephone wires carried on a crossarm and a secondary electric rack on a joint use pole is the measurement made from the top of the crossarm to the bottom of the secondary rack or to the power wires?

A. Vertical clearance is measured from the highest telephone wires to the lowest part of the secondary electric rack and not to the lowest power wire. In measuring clearance to transformers, the measurement is from the telephone wires to the lowest part of the transformer support.

Q. What is the minimum clearance of telephone conductors or telephone cable over the railroad track of a main line railroad?

A. 27 feet between the lowest part of the telephone conductor or cable and the top of the railroad tracks has always been considered the minimum clearance requirement. However, the latest safety code handbook, states, that where a telephone cable is supported by a messenger that the clearance requirement need only be 25 feet. For open wire, however, the clearance still remains at 27 feet.

Q. We have numerous telephone crossings over railroad tracks in our area and would like to know what is the correct method of heighth grading the poles adjacent the crossings.

A. The selection of the poles for a change in grade of a line approaching a railroad crossing will depend on the heighth of the average poles in the line. For example, a 20 foot line approaching a crossing in which the crossing poles are 45 feet in heighth, would require on each side of the track a 25, 35, and a 45 foot pole breaking off from the 20 foot lead. If the railroad crossing poles are 50 feet in heighth on a 20 foot line, a 25, 40 and 50 would be satisfactory and on a 25 foot line a 30, 40, and 50.

Pole Line and Open Wire

Q. What length should stubs be for various length poles?

A. In general 8, 9, and 10 foot stubs are considered satisfactory respectively for a 20, 25 and 30 foot pole. A 45 foot pole should have a 12 foot stub.

Q. Under what circumstances are protectors required at a junction of open wire and cable where the cable terminal is of the unprotected type?

A. This will depend greatly upon the type of high voltage electrical hazards to which the open wire may be exposed. In general and assuming exposure only from the lighting standpoint, one quarter mile is considered the longest length of open wire that should be attached to cable without protection. It has been the editor's experience that in some localities and particularly in the open country where there are very few trees, that wire much in excess of two city blocks is very likely to result in open damaged cable pairs unless protected by open space cutouts.

Testing & Transmission

Q. I have been told that a FREQUENCY METER, suitable for use on a checking ringing machine can be easily contrived from an old ringer movement. Please explain how this can be done.

A. What is known as the **escapement type frequency meter** which consists essentially of an ordinary ringer with its polarized armature and an escapement movement similar to that found in any alarm clock together with a calibrated dial will give good results. Fig. 1 illustrates the general features of a measuring instrument of this type. To use set needle to zero and connect to source under measurement for one minute. This causes the indicating needle to move around the calibrated dial and record the total number of alternations for one minute. The alternations divided by 60 will give the frequency in cycles per second.

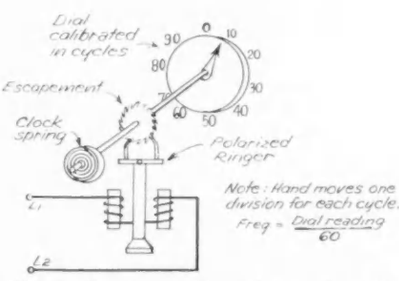
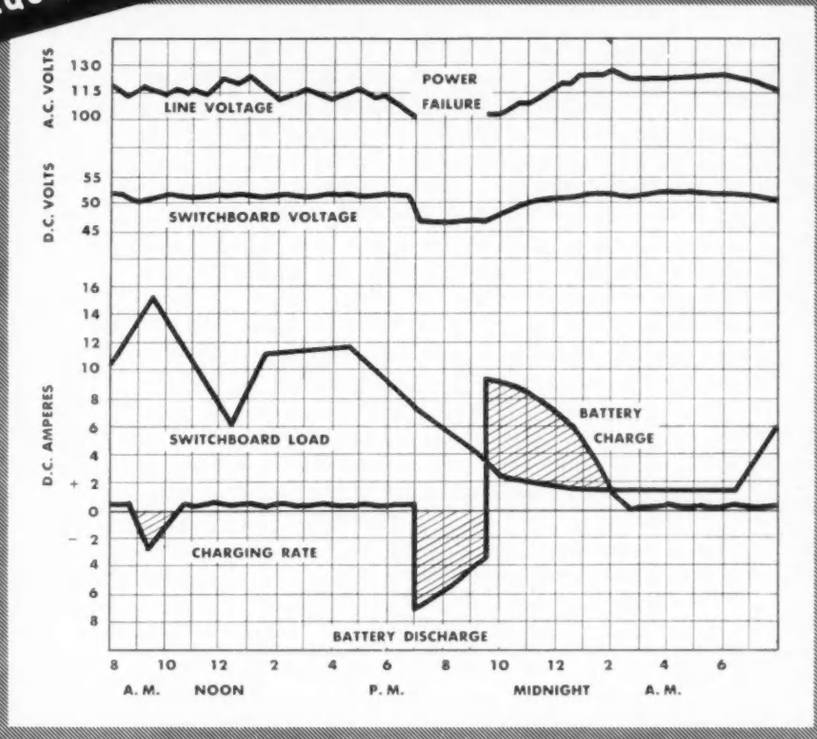


Fig. 1—Escapement type frequency meter.

RAYTHEON RECTICHARGER MEETS EVERY REQUIREMENT FOR TELEPHONE DC POWER



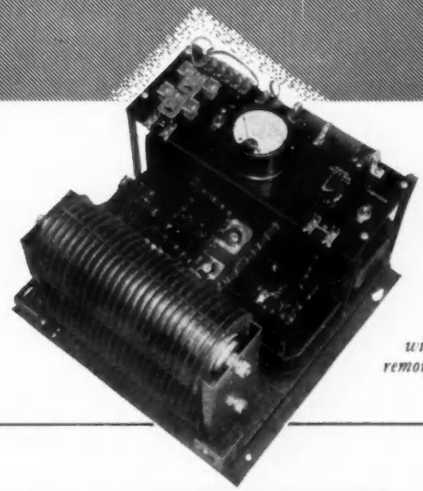
Everyone wants Constant Potential Charging because it insures the best possible telephone operation and because it charges the storage batteries under conditions favorable to maximum life.

The chart shows how the Raytheon RectiChargeR meets every telephone requirement for Constant Potential DC under all operating conditions.

1. NO LOAD
2. VARIABLE LOAD
3. OVERLOAD
4. VARYING AC LINE VOLTAGE
5. AC INTERRUPTION

All of this is accomplished without moving parts and makes the RectiChargeR ideal for unattended operation.

We will be very glad to send you further information or answer any specific questions that you may want to ask.



View with cover removed

RAYTHEON

Manufacturing Company

134 Willow Street, Waltham, Massachusetts, U.S.A.

No. 34A11

An Answer to the Help Problem!

With our No. 34A11 dial type paystation, local calls are handled automatically without an operator. Long distance calls go through the toll office in the usual postpayment manner. Only operating required is that the reverse battery method of supervision be used.

For offices working short-handed due to the war—and where toll operators must be kept free to handle war calls and other urgent business—this type of Gray Pay Station is ideal. It is anti-sidetone and adapted for handset. Same pay station arranged for standard transmitter and receiver is coded No. 34A10.

NOTE—The Government's 6% excise tax is NOT assessed on unattended pay station calls.

AUTHORIZED AGENTS

American Automatic Electric Sales Co.
Graybar Electric Company
Kellogg Switchboard & Supply Company
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The North Electric Mfg. Company
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IN CANADA:

ing Company
Canadian Telephone & Supplies, Limited
Northern Electric Co., Limited

THE GRAY MFG.CO.
HARTFORD, CONN.

PROTECT ALL TELEPHONE PLANTS

(Continued from page 30)

all necessary measures to insure that access to premises containing communications equipment or facilities (other than that part of the premises necessarily open to the general public) be restricted to employes, federal, state or local government officers acting in their official capacity, and other persons considered necessary by the management in the conduct of its business.

December 15, 1941, the Defense Communications Board issued a notice to all communications companies that no **alien** should be permitted to enter the premises (other than the public part thereof) of such companies without permission of Defense Communications Board.

(Copies of this resolution and order will be sent to any Independent telephone company requesting same of this Association.)

(5) Make immediately a thorough survey of all your central office locations and buildings, and of all other buildings in which you have apparatus necessary or important to the unimpaired continuance of your telephone service, to determine what, if anything, can or should be done to further protect them.

Consider, for instance, the advisability of installing wire grills or other protection over ground-floor windows—particularly basement and ground-floor alley or side-street windows, or even of blocking such windows with glass brick, etc.

Study particularly all ordinary methods of entrance to the building, such as front, side and rear doors, and the advisability of making an iron-clad rule that side and rear doors must be kept locked during certain hours, including evening and night.

If the exchange is large, consider the advisability of a guard at the front door after ordinary business hours. Arrange with your police department that the guard be armed, if you think that advisable.

(6) Consider the advisability of installing burglar alarms and fire alarms throughout the buildings.

(7) If the exchange is sufficiently large to have so many employees that all are not known to each other, issue each employe a pass or other positive method of identification as an employe. Also give each employe whose duties may require entrance upon the premises of subscribers and others, some method of identification.

(8) Install and maintain lights over building entrances and exits, and light fire escapes adjoining alleys, and areaways.

(9) Install locking devices on central office and other strategically located manholes.

Require owners of buildings in which important terminals are located to permit only telephone employes to have access to those terminals.

10) Protect entrances to cable vaults, power rooms, battery rooms, transformer rooms, etc.

In large garages, arrange the tours of duty of garage men so that a man is on duty during the night and early morning hours.

Familiarize the local police and fire departments with the location and arrangements, inside and out, of your buildings and premises. The police should be particularly alert in attention to or for calls to telephone premises.

Check carefully your own fire fighting equipment and arrangements. Renew fillings of fire extinguishers, where necessary. Check the number and location of fire extinguishers; add more, if they would be helpful. Familiarize employes with the location of extinguishers, fire hose, etc. Provide portable pumps suitable for use against incendiary attack or damage.

(11) Arrange for your fire insurance agents to have a careful check made of all your insured property, with their recommendations as to changes, if any, that should be made to lessen fire danger.

(12) Prepare for black-outs when and if ordered by the proper authorities and do, in advance, everything necessary to operate under black-out conditions.

The foregoing are only a few of the many suggestions that could be made; any telephone management, if alert to the potential dangers of the situation, can think of and do other things, suitable to its situation and location, to protect its telephone plant and property against things that might happen.

These suggestions are made for the purpose of awakening every Independent telephone management to the fact that there is danger to the telephone plants and service of the country.

Remember that a failure or even partial failure of telephone service which slows up any kind of production in this country, including agricultural production, benefits the enemy.

Do not think that because your plant is small, or not in a defense area, or far from any border of the country, that nothing can happen to it. **Remember Pearl Harbor!**

Let us make sure that no avoidable failure of telephone service happens to any Independent plant.

The Coming Crucial Shortage of Critical Materials

(Continued from page 24)

garding the C. M. P. does not make it clear whether, in such a case, the Army will allot the necessary material to the telephone company, or to the manufacturer for the account of the telephone company, or whether the Army will itself have the equipment manufactured, or even itself build the exchange.

There are many things of this nature yet to be determined from a study of the details of C. M. P., but it seems clear that the result of all of these things is to be a tightening up on the use of all scarce and vital materials.

AS to civilian needs, it seems obvious that if less than 1% of all the copper, for instance, available to the country will be available for strictly civilian purposes, the chances of a telephone company obtaining any substantial amount of any scarce material for strictly civilian uses (such as an addition to plant for civilian service) will be very slim.

There is of course an amount of material still in the inventories of telephone companies; just how much, all together, is probably not known definitely by anyone at present. These inventories constitute the "stockpile" of the operating telephone business. It goes without saying that telephone managements will need to look upon present inventories as something to be used very carefully and only for very necessary purposes.

THE impact of all of this on the telephone industry will apparently be gradual—since C. M. P. does not become fully effective until July 1, 1943—but it will be important. It means that telephone managements and employees must look upon the scarce materials—and almost all materials are now scarce materials—that they need for the operation and maintenance of their plant, as something very precious. It means, naturally, that every possible method that can be devised for conserving materials must be followed. It goes without saying that this fact should be impressed immediately upon every telephone man or woman who handles or uses telephone materials.

Basically, C. M. P. makes good sense. In essence it means simply that no more plans are going to be made for the use of material than there is material available for carrying out those plans—in other words, no more tickets are going to be sold than there are seats. In the long run it will probably be better for the telephone company to know what it can get, than to plan to use material it cannot get. But C. M. P., plus the desperate need of the armed forces for the products of materials that are both vital and scarce, means the telephone industry and all other industries will have to "cut the coat to fit the cloth", and that is going to mean the most careful use of material the industry has ever known.

"Eveready" • "Columbia" • "Gray Label"

The quality cell preferred by telephone engineers.

Long Life Telephone

DRY CELLS

- **Higher sustained voltage.**
- **Longer life.**
- **Rock-bottom economy.**
- **Developed in America's largest dry battery laboratory.**
- **Made by the makers of "Eveready" "Air Cell" Operators' Transmitter Batteries.**

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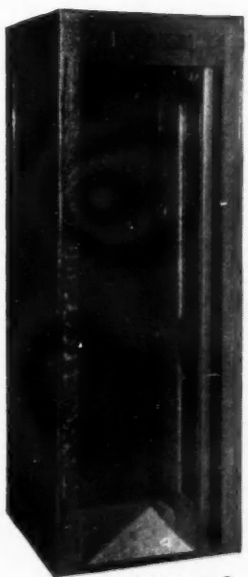

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CHURCHILL

TELEPHONE BOOTH

***Will* INCREASE**

Your Pay Station Business

The CHURCHILL No. 100 Folding Door Telephone Booth is built as a single unit and equipped with a reinforced back panel for mounting a wall telephone or coin collector. Made of selected white oak, finished light or medium oak; or of birch, finished light or medium mahogany. Finished inside and out with stain, shellac and lacquer, in a beautiful satin finish. Electric light and electric automatic ventilator are standard equipment. Booth has no floor. Overall height, 84¾"; width 29"; depth 30½". Shipped knocked down and crated. Write for literature about this and other CHURCHILL telephone booths.

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DAN'L H. McNULTY

Conducts

A MARKET PLACE for listing supplies that are wanted . . . or disposing of equipment or supplies of any kind that may be used by other Independent telephone companies . . . *or for reducing surplus inventories.*

The use of this space is open to anybody and everybody in the Independent Telephone business.

Write us the Material you have 'For Sale' and that is 'Wanted' for listing in our *Direct Mail* Bulletin!

Address all mail to:

DAN'L H. McNULTY
TELEPHONE REPAIR CO.
Rogers Park Station Chicago, Illinois

Personals from the field

J. K. Johnston, secretary of the Independent Pioneers, asked us to advertise for a copy of "The Fight with the Octopus". Two days after the ad appeared a copy was delivered at his office in Indianapolis. The donor: **Louis Pitcher** of the USITA.

•

W. A. Schumacher has been elevated to general superintendent of plant and **A. F. Connery** to chief engineer of the Postal Telegraph-Cable Company. **J. J. Lynch,** for many years in charge of the company plant and engineering department, has voluntarily retired after 54 years service to the company.

•

G. A. Klein, formerly district manager for the Illinois Central Telephone Company, has been transferred to Black River Falls, Wis. He is succeeded by **L. E. Cross** of Dixon, Mo., former owner of the Triangle Telephone Company with exchanges at Dixon and Crocker, Mo.

•

L. A. Gritten, secretary of the Oregon Association, issues a really well-edited bulletin for his members. The tag line on the last one carried this question, "Does anyone still think we can win this war with juke-box mentalities and 40-hour weeks?"

•

Arthur W. Page, vice president of the American Telephone and Telegraph Company, was elected to the chairmanship of the United Seamen's Service executive committee, **Admiral Henry S. Land,** chairman of the board of trustees of the organization recently announced.

•

Robert Wood has been made manager of the Carroll Telephone Company of Delphi, Ind. He has been associated with the company for eight years and served as assistant manager for one year. He succeeds the late **Charles Cartwright.**

•

Gunnard Johnson is the new manager of the Chilton, Wis., exchange of the Commonwealth Telephone Company, succeeding **Carl Mohr,** who resigned October 1 to take a position in Iowa. He was formerly manager of the exchange at Denmark, Wis.

•

Lt. Col. L. D. Densmore, assistant signal officer with the Fourth Army, Presidio of San Francisco, and former general manager of the Central Electric & Telephone Company, Sioux Falls, S. D., is now temporarily located at Fort Monmouth, N. J., for a three months stay.

•

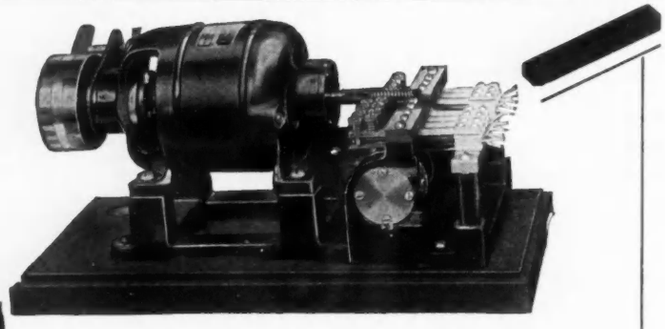
Miss Hazel Hilyard of Clay Center, Neb., and for six years with the Lincoln Tel. & Tel. Co., has entered training in the communications department of the WAAC at Ft. DesMoines.

•

C. A. Peterson, 66, manager of the Morning Sun (Ia.) Mutual Telephone Company, died October 18 of a heart attack following two years of failing health.

•

Joseph E. Byrne, recording secretary of the Wisconsin State Telephone Association, has gained the sobriquet of "Poet Laureate of Wisconsin telephony". He was so dubbed during the National Convention last month by several other State Association secretaries.



HOLTZER-CABOT
MOTOR-DRIVEN INTERRUPTER

Holtzer-Cabot complete motor driven interrupter equipment combines a method of producing good signaling tones with a means for automatic ringing. Holtzer-Cabot interrupter equipment will:

1. Eliminate slow acting relays.
2. Reduce maintenance.
3. Give positive timing.

AND

4. Is SIMPLE AND DEPENDABLE.

Write for Bulletin 1310-02

125 Amory St. BOSTON, MASS.
Motor Specialists
6161 S. State St. CHICAGO, ILL.

A. J. Parsons

A. J. Parsons, secretary of the Illinois Association, has notified us that the Chief Operator's and Supervisor's School scheduled for Peoria, Ill., on November 17-18-19 has been postponed indefinitely for war-time reasons.

•

Roland C. Davies, our Washington correspondent, covered the NARUC convention at St. Louis last week. His Telecommunications Reports is issued weekly from Washington and covers the news of the communications industry for many telephone executives. His writings in TELEPHONE ENGINEER & Management give you late details of happenings in Washington.

•

E. F. Ferguson, who left the Gustav Hirsch organization of Columbus, O., last Spring for Army service has been promoted from 1st Lieut. to Captain in the U. S. Signal Corps.

•

J. W. Admire, manager of the Council Grove, (Kans.) Mutual Telephone Company is taking conservation of materials seriously. According to newspaper reports he and his line crew have manufactured 18 telephones from discarded parts and now have them in operation.

•

Harold Spangler, formerly with the Northern Ohio Telephone Company at their Bowling Green, O., exchange, was killed September 17 while piloting a plane in a raid over Germany. He was a member of the Royal Canadian Air Force.

•

Lineman **Bill Hess** of the Amana Society Telephone Company of South Amana, Ia., has come to fame in a tub. While taking down old line no longer needed by their new dial system **Bill** had to do some work in a creek. Having no hip-boots, he set sail in a large tub borrowed from the local meat market but capsized midway of his goal. You are right, it was quite shallow, as is his grin when the kidding starts.

•

Benjamin F. Gibson, Ohio Bell directory manager, was honored by a luncheon in Cleveland last month and presented with a service pin marking his 40th year in the telephone business.

•

James E. Ross, 60, for a number of years president of the Hartsgrove, O., telephone company, died recently after a three year illness.

•

William (Bill) E. Moler, 76, Athens, O., a pioneer telephone man, died in Bedford, Va. recently.

•

Lloyd C. Bruner has been made local manager at Sheffield, Ia., and **Clifford Vansickle** has been promoted to local manager at Manilla, Ia. Both exchanges are owned by the Central Electric and Telephone Company.

•

Glen Bentley is the new resident

SUB-CYCLE

A POWERFUL RINGING CONVERTER

Has Proven Its Efficiency Under Most Severe Operating Conditions

Sub-Cycle is built for heavy duty—requires no routine maintenance—cannot interfere with radio reception—is economical in operation and quiet — output voltage regulation between no load and full load is very close. In it there are NO MOVING PARTS TO ADJUST.

MANUFACTURED IN SIX MODELS FOR LOADS RANGING FROM SMALL PBX TO THE LARGE CENTRAL OFFICE

ALSO PULSATORS

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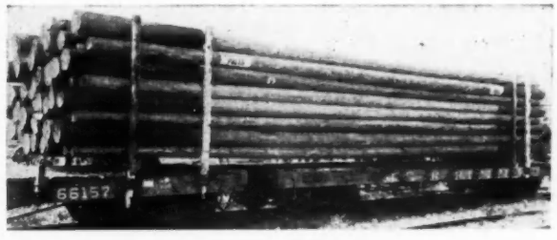
PAGE & HILL CEDAR POLES



for— Long Dependable Service at Low Cost

P & H Northern White Cedar Telephone Poles—Standard of the industry for 41 years—now available with an amazingly effective, LOW-COST protection against sapwood decay and termites. P & H "PENTA" POLES are full-length treated with a preservative many times more toxic than others in common use. As distributors, we recommend them.

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Factory and General Offices: 100 Carlson Rd., Rochester, N. Y., U. S. A.

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manager of the Crane (Mo.) Telephone Company.

•

John F. Reding, formerly traffic superintendent of the Illinois Commercial Telephone Company with office at Springfield, Ill., has been appointed traffic superintendent of the central operating group of the General Telephone Company, with office at Madison, Wis. He is succeeded by **George Henterseher,** formerly located at Lafayette, Ind.

•

Henry B. Fitzhugh, for 25 years an employe of the American Telephone & Telegraph Company in Nashville, Tenn., died unexpectedly October 25 in Atlanta, Ga. Mr. Fitzhugh's position at the time of his death was that of transmission supervisor.

•

H. O. Ostberg, Des Moines, Ia., has been appointed manager for the Northwestern Bell Telephone Company at Sioux City, Ia., succeeding **J. K. Donahoe,** who has accepted the position of assistant manager for the Pacific Telephone and Telegraph Company at Camp Ord, Calif.

•

Frederick R. Lack, vice president and manager of the Radio Division of the Western Electric Co., was appointed Oct. 28 to a newly created position in the Navy and War Departments as the Director of the Army-Navy Electronics Expediting Agency.

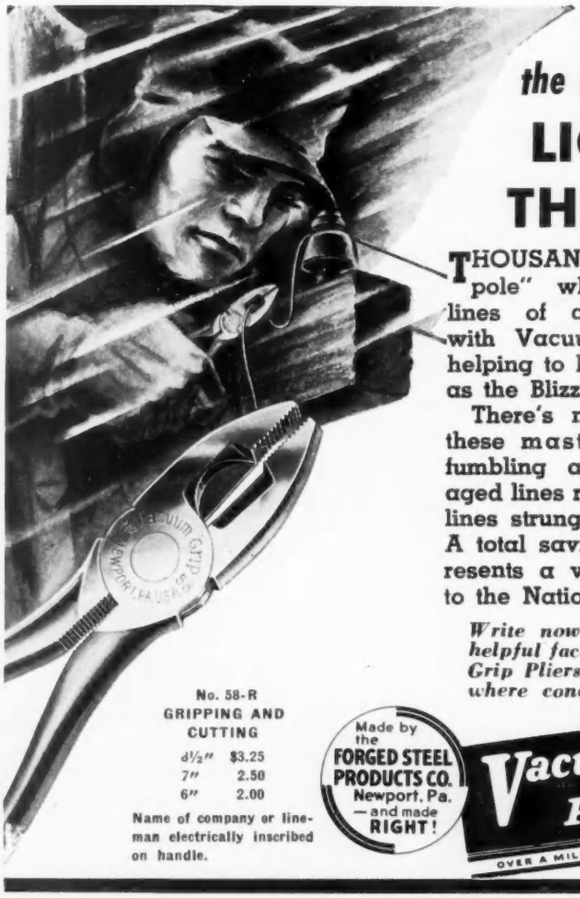
•

Rene Pleven had been appointed commissioner for foreign affairs and colonies by the fighting French national committee in London. **Mr. Pleven** was formerly resident director for the Associated Telephone & Telegraph Company and foreign representative for the Theodore Gary & Company interests.

Gas Ration Note

All industries with establishments at which more than 100 employees are working, including communications, will be required to set up Organized Transportation Plans under the nationwide gasoline rationing under an Oct. 28 OPA announcement. This plan will be inaugurated by OPA as a requisite for securing supplemental gasoline ration allowances above the "A" ration.

In tightening the restrictions on eligibility for the "C" rations, the OPA ruled as eligible engineers, construction workers and maintenance men and executives, technicians and office workers of utilities in necessary travel.



When "Licking the Blizzard" means

LICKING THE AXIS

THOUSANDS of men "on the pole" who keep America's lines of communication open with Vacuum Grip Pliers are helping to lick the Axis as well as the Blizzard.

There's no lost motion with these master-built pliers—no fumbling and haggling. Damaged lines rapidly restored. New lines strung with greater speed. A total saving of time that represents a valuable contribution to the National War Effort.

Write now for Booklet giving helpful facts about ALL Vacuum Grip Pliers—then try them out where conditions are toughest.

No. 58-R
GRIPPING AND CUTTING
4½" $3.25
7" 2.50
6" 2.00
Name of company or lineman electrically inscribed on handle.

Made by the FORGED STEEL PRODUCTS CO. Newport, Pa. —and made RIGHT!

Vacuum Grip Pliers

OVER A MILLION AND A QUARTER IN USE

Book Review

ELECTRICAL FUNDAMENTALS OF COMMUNICATION. By Arthur L. Albert, Professor Communication Engineering, Oregon State College. McGraw-Hill Book Company. 554 pages—1942.

This distinctive book deals with electrical fundamentals from the point of view of communications—telegraphy, telephony, and radio. Designed for beginning students, the treatment is elementary, yet at the same time maintains a high standard of technical accuracy and provides a sound foundation in the subject. Examples illustrating the electrical fundamentals are given throughout the text, and many of these are numerical solutions, typical problems and circuits found in communication.

Four to One Ratio For Texas Company

One out of every four male employes of the San Angelo (Tex.) Telephone Co. now are in the military service. And in addition to the 17 already in, two others are enlisted reserves.

The service roll at present follows:

Army—Corp. Charles W. Caston.

Signal Corps—Pvt. Henry Gregg.

Marines—Pvt. Knox Robbins.

Navy—Tom Morrison, electrician second class; Wylie McGee, electrician second class and George Young, Jr., seaman first class.

Aviation cadet (Navy)—Bob Neves.

Aviation cadet (Army)—Ray Hanson (to get commission in week or two).

Aviation cadet (Air Corps Engineer)—Jo Hardgrave.

Air Corps Gunnery School—Pvt. J. H. Brasher, Jr., of Conora.

Air Corps—Pvt. Reginald Cook, service squadron; Corp. Jack Gregg, parachute rigger; and Tech. Sgt. John Banta, Sgt. Carl Deans, Corp. Jim Petty, Pvt. Rudy Probst, and Pvt. Sidney Rogge, all post communications.

Air Corps Enlisted Reserve (signed up subject to call as aviation cadets)—Clayton Blakeway and Frank M. Swift.

Mohr to Iowa

Karl Mohr, manager of the Commonwealth Telephone Exchange at Chilton, Wis., for the last ten years, has resigned his position to become district manager for the Iowa Continental Telephone Co. and moved to Washington, Iowa, Oct. 1.

Karl has been with the Commonwealth Telephone Co. for 16 years and has served the company in various places and capacities in Wisconsin. His experience includes every phase of the business from installing equipment and repair work to managing.

Another Ohio Signal Corps Unit to be Activated

COMPLETION of the unit cadre for the Thirty Ninth Signal Construction Battalion, the second big Signal Corps unit to be sponsored by the Ohio Independent Telephone Association under the affiliated plan, is announced by Frank L. McKinney, secretary-treasurer of the Association.

Officers and non-commissioned officers of the Battalion are scheduled to be called up for preliminary training during late October, following which the unit will be formally activated, and enter upon its duties at the point designated by the war department.

The list of those applying for service with the Thirty Ninth, and recommended for such duty by the Ohio Independent Telephone Association, includes;

Captains: Walter R. Cutnaw, Columbus, and Charles H. Hoover, Columbus.

Lieutenants: Edwin N. Hazlett, Rocky River; T. A. Saunders, Clinton, Ill.; Samuel F. Nixon, Westfield, N. Y.; C. B. Morton, Lebanon, Mo.; Albert H. Keyes, Ironton.

Master Sergeants: W. W. Case, Hudson; L. D. Beckett, Wilmington; M. S. Hagerty, Warren, and L. P. Schafer, Cincinnati.

Technical Sergeants: A. H. Bergman, Mansfield; E. W. Ford, Cambridge; H. B. Thompson, Bremen; L. A. Hanshue, Medina; W. M. Manchester, Geneva; R. L. Fitton, Warsaw, Ind.; Galen P. Klepinger, Troy; Henry A. Miller, Cambridge; Robert F. Chinworth, Warsaw, Ind.; and C. C. Breyley, Spencer.

"It is our intention to continue with the organization of these units, just as long as we can be helpful to qualified telephone men with good service histories, who are seeking commissions or positions as non-coms, in the United States Signal Corps," advises Secretary McKinney, in outlining his Association's policy for the immediate future.

"We are now accepting applications for a third Signal Battalion that will provide positions for two Captains, five first Lieutenants, four second lieutenants, four master sergeants, and seven technical sergeants, all of whom must have had line construction experience.

"In order to cooperate with sister Associations in nearby states, that for perfectly valid reasons are not in a position to undertake the sponsorship of complete units at this time, we will, until their own state organizations can take care of them, accept the applications of well qualified men from outside Ohio. Such applicants will be extended every advantage that we extend to our own Buckeye lads, and our only requirement is, that such applicants furnish us with the details of their telephone experience, education, draft status, etc. in their first letter.

"The organization of these units calls for a large amount of paper work, and candidates for positions in the military service will expedite the handling of their applications by telling us as much as possible about themselves when writing us for information. All letters relating to the new unit should be addressed to Frank L. McKinney, Secretary, The Ohio-Independent Telephone Association, 42 E. Gay Street, Columbus, Ohio.

We reproduce extracts from some

Ironite

The Better DROP WIRE

Again proves itself as a conserver of vital war materials. Meets all demands for efficient service . . .

Unusual Strength — **High Dielectric Insulation**
High Conductivity — **Easy Workability**
Long Life — **Moderate Cost**

Made, for 37 years, by
PARAGON ELECTRIC COMPANY

Distributed By:
STROMBERG-CARLSON TELEPHONE MFG. CO.
Factory and General Offices: 100 Carlson Rd., Rochester, N. Y., U. S. A.
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AMERICAN CREOSOTE WORKS PINE POLES

For greater strength and outside plant economy, choose American Creosote Works' southern yellow pine poles.
Tests have proven that yellow pine poles are ***stronger.*** Pressure-treated with creosote, they are thoroughly preserved to assure long life. They stand up in storms, sleet, and high wind.

Fast shipment and quick service are assured.

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Chicago Kansas City San Francisco Toronto

Make Them Fight, Too!

Those out-of-service desk stands still have one good fight left in them. And maybe you need them today to keep service going.

When you enlist them for service, send them to Suttle for a complete new outfit, so they can do a good job.

There is no semblance of a "rebuilt air" about a Suttle Remanufacturing job. You can depend on it to make your stands ready for hard service.

Same old pre-war prices for either common battery or magneto.

SUTTLE
EQUIPMENT COMPANY

recent Army and Navy letters reaching the Ohio Association secretary. For obvious reasons, the names of the writers are not quoted.

From a Staff Sergeant,—"The other day we had a break. I went in to the Company Commander to ask that all of the men with me be made 1st class privates, and he said that it was asking too much for one department to ask for a mass promotion, but that he would consider it and let me know in a day or two. The next day they were all made 1st class, and he said that we had shown more progress than all the other departments. This is due to the hard work on the part of all ..... They have worked like dogs and just don't know the meaning of the word 'quit.'"

A Technical Sergeant writes,—"Perhaps you may be interested in our trip so I'll give you a few of the details. We were delayed getting our uniforms at Ft. Hayes and six of us got ours on Friday, and the other four on Saturday. As a result they sent us six out on Monday and the others on Tuesday. We were sent west the.... ..... route and given intermediate fare, pullman and club car. Everyone on the train was swell to us. They were all friendly and ready to help. It was a long old trip, of course, but we saw lots of country. They took us across the golden gate on a ferry, and we had some time in San Francisco to look around."

Compliment to his fellows from a telephone man serving as a Master Sergeant,—"This is a great bunch and I'm happy to be one of them."

Clipped from the letter of a Lieutenant while on Desert maneuvers,—"This letter marks a week and a day spent in the desert, and, since I was never afraid of going to Hell, it's handy to have a preview of it. No one seems to know just what the temperatures really are, as thermometers break at the 120 degree mark. Various estimates run 125 to 130 degrees. At night it cools off, to about 100 and by daylight it is 70 to 80. Tempers sometimes become short, and its a tough enough grind, but you can see our fellows hardening and tearing into their jobs more efficiently with every day that passes. We are getting just what we have needed and our usefulness increases as our bellies harden."

From a Lieutenant-Commander in the Carribean,—"As for myself, I am well, have put on about ten pounds, brown as a chestnut, in fact all I need is a haircut. It has been two months since I left civilization."

Another Signal Corps Lieutenant says,—"I find the duties prescribed for my particular command to be matters with which I am already familiar, and I have only to become acquainted with army procedure and methods. Have been employing such spare time as I have, to become as familiar as possible with the other branches of operations, in order to get a picture of the entire unit, and to be able to lend a hand whenever asked."

A leading Buckeye telephone man, now serving as a Major, reports on accelerating military momentum. He says,—"This life is intensely interesting and exciting. This is one of the largest bombardment bases in this country. I don't know how much longer I will be here. Things are really on the move now. I was very much pleased to receive several letters recently from my telephone friends back in Ohio. It is nice to hear from old friends, and to keep in touch with what is going on back there."

Between maneuver problems, a Lieutenant writes,—"At the moment I'm sitting on the shady side of a 2½ ton truck, in which is housed our Battalion headquarters and drinking orange juice sent up by the mess sergeant. There is a cooling breeze blowing, and now and then a bucket of dirt in it, but I'm accustomed to that now. Since maneuvers here started, I've been with the ...th Battalion all the time, and enjoying the work very much.

WON'T YOU HELP US ROLL 'EM UNDER

Electric wire and cable reels are urgently needed for vital shipments. One way you can help to "keep 'em flying" is to help *us* keep 'em rolling by returning empty spools and reels as soon as they become available.

For War Communications!
Roebling Electric Wires and Cables for telephone use are made in our mills, under complete Roebling supervision.

RETURN REELS AND SPOOLS PROMPTLY

JOHN A. ROEBLING'S SONS COMPANY • TRENTON, N. J.
Branches and Warehouses in Principal Cities

JR ROEBLING

ROEBLING
ELECTRIC WIRES AND CABLES

QUANTITATIVE DESIGN OF CENTRAL OFFICE EQUIPMENT FOR SMALLER TELEPHONE OFFICES

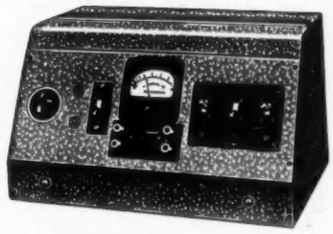
By JAY G. MITCHELL

High Efficiency Switching Systems

IN ANY proposed new or rehabilitated existing telephone office the objective in view in the Quantitative Design of the Central Office Equipment is the conservative determination of "How Many" or "How Much" equipment shall be purchased and installed. The use of the word office, in this connection, is probably incorrect, however, because of the fact that telephone offices, in the conventional sense, are not always involved in calculations of this kind. One of the most promising fields for the relief of unsatisfactory traffic and maintenance conditions lies in the establishment of new operational centers which are suitable for unattended mechanical switching units. Consideration of the economics of the situation will often point to this method as the feasible resource for adequate relief. Small centers where there is a definite Community of Interest factor should always be analysed with this possibility in view. When such unattended operational centers are fully justified by the economics of the case a careful consideration of the Central Office Equipment must, obviously, be made and if the word office is applied to such centers it is probably incorrect. Such centers may be designated by the very expressive term "Satellite" or "Unattended Subsidiary" more accurately.

Installations of this sort must be designed, in many cases, without definite traffic data. This is because the group of circuits which they are to

No. 692 SHALLCROSS TRANSMISSION TEST SET*



for rapid and accurate measuring of Transmission Losses

★ Has a tone Source . . . variable from 0 to 18 D B
★ Has a Decibel Meter . . . range from 10 D B through 0 to plus 6.
★ Has Attenuation Pads . . . range, in 5 D B steps, 0 to 35 D B
★ Reference Level . . . 1 milliwatt 600 ohms

*This is just one item of the Shallcross complete line of Shallcross Telephone Testing Equipment . . . Decibel Meters . . . Tone Generators . . . Attenuators . . . Current Flow Test Sets . . . Service Meters . . . Fault Location Bridges.

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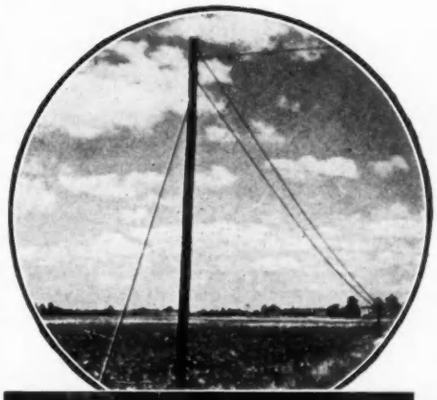

Crapo HIGH-TENSILE LOW-RESISTANCE LINE WIRE

SAVE MAN-HOURS CONSERVE MATERIALS!

NOW—more than ever—time and material are of vital importance. You conserve both when you specify **Crapo** High-Tensile Line Wire for essential new construction and for necessary replacement.

Longer, stronger spans, made possible by these high-strength wires, reduce the number of pole structures, conserve materials and save man-hours both in building and in maintenance.

Crapo HTL-85 permits spans of 225 feet in heavy loading districts; provides stronger, safer spans on existing lines.

Crapo HTL-135 makes practicable spans of 350 feet in heavy loading, 500 feet in light loading areas. Both are superior to standard B.B. wire in transmission qualities.

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It is no coincidence that the Army, Navy, large Power and Telephone Companies alike specify Cope Tools and Equipment. They demand the best and have confidence in our ability to serve them.

WRITE FOR CATALOG

T. J. COPE, INC.
6120-6122 VINE STREET
PHILADELPHIA, PA.

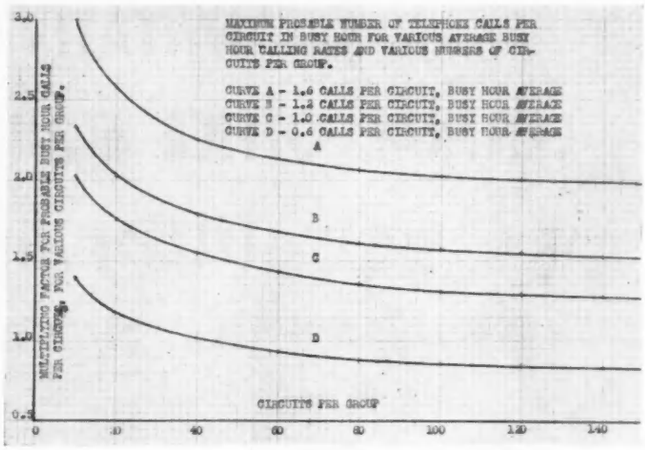

MAXIMUM PROBABLE NUMBER OF TELEPHONE CALLS PER CIRCUIT IN BUSY HOUR FOR VARIOUS AVERAGE BUSY HOUR CALLING RATES AND VARIOUS NUMBERS OF CIRCUITS PER GROUP.
CURVE A - 1.6 CALLS PER CIRCUIT, BUSY HOUR AVERAGE
CURVE B - 1.2 CALLS PER CIRCUIT, BUSY HOUR AVERAGE
CURVE C - 1.0 CALLS PER CIRCUIT, BUSY HOUR AVERAGE
CURVE D - 0.6 CALLS PER CIRCUIT, BUSY HOUR AVERAGE
MULTIPLYING FACTOR FOR PROBABLE BUSY HOUR CALLS PER CIRCUIT, FOR VARIOUS CIRCUITS PER GROUP.
CIRCUITS PER GROUP
A
B
C
D
3.0
2.5
2.0
1.5
1.0
0.5
0
20
40
60
80
100
120
140

Fig. 1—Relation between overall calling rate per circuit for entire office and probable calling rate for each circuit in circuit groups of various numbers of circuits per group, Busy Hour demand.

serve are often to be segregated from the circuits in a much larger area than the one to be established. Even in such cases, however, the designing engineer should have the general data for the larger group of subscribers' circuits from which the proposed group is to be taken. Such data may well serve as a guide in the determination of the number of connecting circuits to be provided in the proposed smaller unit. In all such cases care must be exercised to assure provision for the installation later of additional connecting equipments when and if needed. This applies to building capacity as well as equipment space, cable entrance facilities and storage and is important because of two factors. The first factor is the lack of specific traffic data for the subscribers' circuits to be served and the other factor is the possibility that the new service may be unexpectedly popular or that new residential or industrial developments may impose unanticipated demands on the unit which are entirely out of line with any previous indication for that area.

In all types of high efficiency switching systems, including the so-called feature manual common battery equipment as well as semi-mechanical and full dial or automatic, the high efficiency is attained by the substitution of electrical or mechanical means in some of the functions of switching for manual work done in simple central office equipment by the operators. Because of this replacement of manual effort by mechanical and electrical means the demands for energy from the storage battery, in such systems, per thousand calls will exceed the demands for energy for the simple common battery systems as computed in the last installment to illustrate the method of Circuit Analysis. Because of the increased use of mechanically and electrically actuated equipment for many operating functions it follows that the equipment in high efficiency switching systems must be adequately designed for the **maximum demands** likely to be encountered. This, as will be apparent, is because of the ability of the operators in working with simple manual equipment to respond to unusual demands by greater concentration of effort. Obviously, in proportion to the degree of employment of mechanical devices, this ability is reduced and in dial systems is entirely lost insofar as the dial equipment is assigned to handling calls. The Quantitative Design, therefore, of central office equipment of the high efficiency type calls for the consideration of the permissible delays on individual calls and the provision of sufficient switching equipment to negotiate the **maximum traffic demand** on the basis assumed as acceptable.

Basic Effect of High Efficiency Telephone Switching

IT MAY be said the basic overall purpose of using high efficiency switching equipment, is to consolidate the traffic streams progressively from smaller to larger groups of circuits. When this purpose is realized the capacity of individual circuits, in calls per busy hour, is increased solely because of their inclusion in groups of larger numbers of circuits per group. An obvious illustration of this fact is afforded by the use of ancillary answering lamps and jacks. By this simple expedient, which is an element in almost all manually operated common battery "Feature" switchboards, an increased number of operator's positions and consequently an increased number of **connecting cord circuits** are made accessible to many or all of the calls originated by the subscribers. The assignable traffic load, in calls per busy hour, is higher for each connecting circuit when the circuit is included in a group containing a greater number of circuits **each of which is equally accessible to the traffic.** The relation between the number of cir-

cuits included in the group and the assignable carrying capacity of each circuit is shown in the curves of Fig. 1.

Referring to Fig. 1, which has been shown in much reduced form in a previous installment and for a purpose somewhat different from that requiring its reproduction, four curves "A", "B", "C", and "D" are given. Each of these four curves shows the conditions, for circuit groups of different numbers of circuits per group, for one overall average busy hour calling rate for the entire office in calls per circuit. Refer to curve "D" for instance. This curve, as is stated in the legend, represents the effect upon individual circuit **capacity in calls during the busy hour** of being included in groups of various numbers (10 to 150) of circuits per group. It may well be asked why all computations of this sort are correlated with the **Busy Hour Traffic.** The answer to this inquiry is quite obvious. Provision must be made, in any telephone operational center (manual office, dial office or dial unattended subsidiary) for sufficient connecting equipment to meet the demands of the **busy hour.** Any hourly period which offers lower demands in calls for connecting equipment than the busy hour will obviously not encounter any equipment inadequacy if the demands of the busy hour have been anticipated in providing equipment. Referring therefore to curve "D" it will be noted that when circuits are grouped into groups of 10 circuits per group and the general overall average demand for the entire office for the busy hour is 0.6 calls per line then connecting equipment must be provided for each group of ten subscribers' lines sufficient to handle **not 0.6 calls per circuit but 1.4 calls per circuit.**

In other words it is necessary to anticipate 14 busy hour calls in a fixed group of 10 subscribers' circuits, when arranged in groups of ten circuits having equal access to the connecting equipment, rather than 6 busy hour calls which is the number of calls in the average ten lines during the busy hour based on the overall average in the entire office.

REFERRING again to curve "D" it will be seen that when the circuits are assembled into groups of fifty circuits per group the number of busy hour calls per circuit that must be anticipated in the provision of connecting circuits is 0.97 rather than 0.6. From the same curve it will be noted that when the overall average busy hour calling rate is 0.6 calls per line if the subscribers' circuits are grouped into groups of 100 line circuits per

(Please turn to page 50)

Added Opportunity

FOR

SERVICE

WITH

Gray Paystations

Because of the unusual conditions affecting all of us there are tremendous demands on telephone companies in nearly every part of the country. Sudden shifts in population . . . factories springing up in formerly agricultural districts . . . whole new cities and towns mushrooming. All these things play their part.

Where demands for individual telephones cannot be met, paystations to serve groups may be the answer. And sudden, heavy increases in population — transient or permanent—mean new stores, new restaurants and other business places which call for paystations.

Here are the opportunities for you to serve many people—and at the same time serve the country — by establishing paystation telephone service for people who might otherwise be wholly or partly denied.

GRAY PAY STATIONS

DISTRIBUTED BY

AMERICAN

AUTOMATIC ELECTRIC

SALES COMPANY

1033 WEST VAN BUREN STREET · CHICAGO, ILLINOIS

BRANCH WAREHOUSES AT DALLAS, KANSAS CITY, LOS ANGELES, RICHMOND (VA.) AND SAN FRANCISCO

On the opposite page is a new Western Electric advertisement which will appear in the weekly magazines listed below with a circulation of more than 10,000,000 copies. Its purpose is two-fold: (1) to explain the vital part communications play in every phase of modern war; (2) to help the nation understand why war needs for telephone equipment and service must come first.

See this ad in full color in

Sat. Eve. Post . . November 28
Life . . . . . November 30
Collier's . . . . . December 12

COMMUNICATIONS
...directing arm of combat

This battle drawing was prepared with the aid of Army and Navy authorities.

IN modern battle, our fighting units may be many miles apart. Yet every unit, every movement, is closely knit into the whole scheme of combat—through communications.

Today much of this equipment is made by Western Electric, for 60 years manufacturer for the Bell System.

Here are some examples of communications in action.

1 Field H.Q. guides the action through field telephones, teletypewriters, switchboards, wire, cable, radio. Back of it is G. H. Q., directing the larger strategy . . . also through electrical communications. The Signal Corps supplies and maintains all of this equipment.

2 Air commander radios his squadron to bomb enemy beyond river.

3 On these transports, the command rings out over battle announcing system, "Away landing force!"

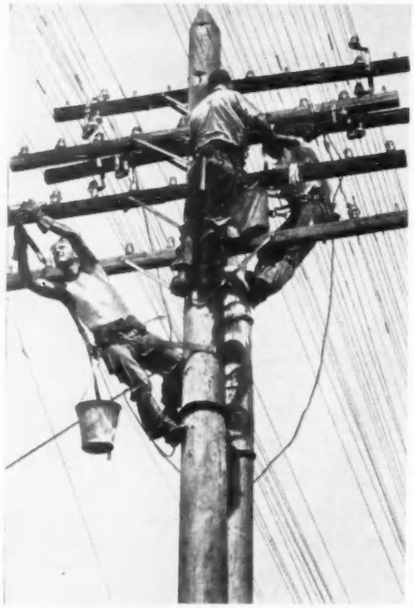
4 Swift PT boats get orders flashed by radio to torpedo enemy cruiser.

5 From observation post goes the telephone message to artillery, "Last of enemy tanks about to withdraw across bridge . . ."

6 Artillery officer telephones in reply, "Battery will lay a 5 minute concentration on bridge."

7 Tanks, followed by troops in personnel carriers, speed toward right on a wide end-run to flank the enemy. They get their orders and keep in contact—by radio.

Western Electric
ARSENAL OF COMMUNICATIONS



Skillful Maintenance Vital to War Effort

● Keeping communication lines at top efficiency demands constant vigilance and skillful maintenance in these crucial times. By careful planning and judicious use of available materials, telephone companies are doing a great job in maintaining vital service.

● Where open wire circuits are involved, the industry specifies *Crapo* High-Tensile Line Wire for repairs and replacements and for essential new long-span construction. The rugged strength of these revolutionary wires provides that extra factor of safety which minimizes the possibility of breaks, saves man-hours and materials.

● *Crapo* HTL-85, with 60% greater tensile strength than standard B.B. wire, permits spans to 225 feet in heavy loading districts; provides stronger, safer spans in existing lines. *Crapo* HTL-135, with two and one-half times the strength of B.B., makes possible spans of 350 feet under heavy loading conditions.

• • •

Write for Bulletins 201 and 202!

Ask the distributor of *Crapo* Galva-Products!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

group having equal access to the connecting circuits it will be necessary to provide connecting circuits for such groups adequate to handle an average busy hour calling rate of 0.85 calls per circuit rather than 0.6. The practical effect of this law may be illustrated as follows. In a given type of equipment the subscribers' line circuits are grouped, by the mechanical construction of the equipment, into groups of line circuits comprising 100 circuits served by one group of connecting circuits. With an average overall busy hour calling rate of 0.6 calls per circuit for the entire office it will be necessary to provide connecting equipment sufficient to handle 85 calls from that one group during the busy hour. (0.85 times 100 is 85). If the same subscribers' line circuits are served by equipment which, by mechanical construction, is limited to 50 subscribers' line circuits per group having equal access to the connecting circuits then it would be necessary to provide connecting equipment sufficient to handle 97 busy hour calls from the two 50 line circuit groups. (o.97 times 100 is 97). Now 97 is 14% greater than 85. The fact that the traffic load is, on the overall average, the same (0.6 per circuit busy hour) in both assumed cases does not alter the fact that when subscribers' line circuits are grouped into groups of 50 line circuits it is necessary to provide 14% more connecting equipment for each 100 line circuits than would be necessary if the subscribers' line circuits were grouped into groups of 100 line circuits per group. To put the result in another form it may be assumed that the subscribers' lines are mechanically limited to 50 line circuits per group. With equipment which is so constructed as to mechanically limit the size of the subscribers' line groups to 50 circuits; if the number of connecting circuits required for an overall entire office calling rate of 0.6 calls per busy hour with **groups of 100 subscribers' line circuits per group** be provided then only **87 lines could be safely** included in the two groups assigned to the connecting circuits (in this case in two groups) provided. From the same curve ("D") it may readily be seen that 100 subscribers' line circuits limited mechanically to groups containing ten circuits per group (a ridiculous assumption made for illustrative purposes only) would require that connecting circuits be

"I feel kinda guilty when I think of all those guys back home doing without tires!"

provided sufficient in number to handle 140 calls per busy hour when the overall average calling rate for the entire office is 0.6 calls per line per busy hour. It is to be noted that as the number of subscribers' line circuits per group is increased the calling rate for which connecting equipment must be provided gradually approaches the overall average for the entire office. In curve "D", for instance, it can be seen that at some point on the curve to the extreme right the curve will approximate 0.6 calls per line per busy hour.

General Code Director of Signal Operating Services

Brigadier General James A. Code, Jr., Deputy Chief Signal Officer, has been designated as the Chief of the Signal Operating Services in a post companion to that of Chief of the Signal Supply Services which is held by Major General Roger B. Colton. Under a recent realignment of the Office of the Chief Signal Officer, General Code thus will hold the two posts of Deputy Chief Signal Officer and Chief of the Signal Operating Services.

Ray Named by A. T. & T.

John H. Ray was elected vice president and general counsel of the American Telephone and Telegraph Company at the meeting of the company's Board of Directors October 21.

Mr. Ray has been counsel of the company since 1936. During nearly 20 years of service with the Bell System he has also served as vice president and general counsel of the Western Electric Company and, before that, as general solicitor of A. T. & T. Prior to joining the A. T. & T. Company in 1923 he practiced law in Minneapolis. In his new post Mr. Ray succeeds the late Charles M. Bracelen, whose death occurred on October 8.

K. L. Rasmus Named

Alfred Markuson, who was telephone manager at Lakeville, Minn. the past 26 years, resigned recently and K. L. Rasmus of Farmington will succeed Mr. Markuson.

Mr. Markuson was manager of the **Central Electric Telephone Co.** the past 14 years, and before that he managed the Star Telephone Co. 12 years. Mr. Markuson intends to follow the electric and telephone line of work but is undecided just where he will go.

Minnesota Company Sold

The Minnesota Commission has approved the sale of the Euclid Telephone Company to Mrs. Anne Palen Hardin in their order issued October 15. The Euclid Telephone Company was the seller and in the sale included all physical properties of the company operating at the Village of Euclid, Minn.

Huge Saving of Copper

Conservative estimates show more than ten million pounds of copper were saved during the first nine months of 1942 by the use of Copperweld (copper-covered steel) wire, rods and strand, instead of copper, by power and communication companies, railroads, and the Army and Navy.

The total amount of Copperweld used instead of copper was more than fifteen million pounds. Copper wires use 100 percent copper whereas Copperweld wires use only 30 or 40 percent copper. Copperweld was used by the Army and Navy for wire and radio communication systems, by telephone companies as line wire and drop wire, by power companies for transmission and distribution conductors, and by other users for miscellaneous applications which require wires combining high strength, rust-resistance, and electrical conductivity.

Research work on many bi-metallic products by the Copperweld Steel Company is constantly increasing the number of copper-saving applications for Copperweld products.

INSTALL
SUB-CYCLE
THE MASTER RINGING CONVERTER

That MEETS
Your Requirements

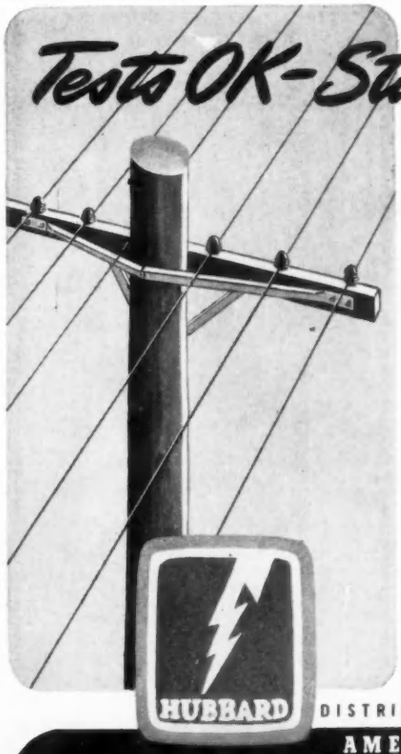
Provides Ample Power. Requires no Routine Maintenance. Cannot interfere with Radio Reception. Economical and Quiet in Operation. 6 Models for loads ranging from small PBX to the large central office. Output capacity 7½ watts to 40/50 watts.

MANY EXCLUSIVE FEATURES
NO MOVING PARTS
NOTHING TO ADJUST
Also PULSATORS

★

Sold by Leading Distributors
LORAIN PRODUCTS CORPORATION
Lorain, Ohio

Tests OK—Stays that way
WITH
HUBBARD HARDWARE



It's a good thing to know that Hubbard Hardware keeps lines testing OK in times like these. For, every piece of Hubbard Hardware used means that much more valuable metal freed for our intense war effort. Hubbard means less replacement, longer service. It's the kind of hardware it pays to use.

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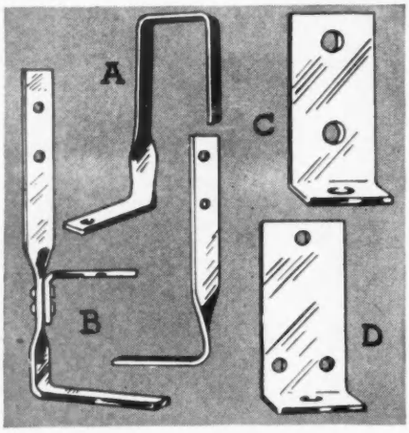
BRANCH WAREHOUSES AT DALLAS, KANSAS CITY, LOS ANGELES, RICHMOND (VA.) AND SAN FRANCISCO

. . . from the
COMPLETE LINE OF
OLIVER
POLE LINE MATERIALS



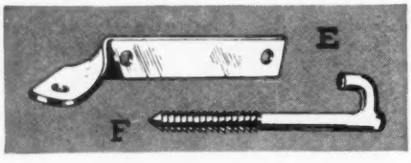
BRACKETS

all types and sizes for telephone line work

(a) Known as the Western Union standard, this bracket is clamped on the arm with a 3/8 x 4 inch carriage bolt.

(b) Standard Bracket for phantom circuits or four wire transpositions. Includes two parts, the smaller projecting above the arm. Two 3/8 inch round holes provided for lagging to the arm to prevent side movement.

(c and d) Telephone Distributing Brackets, ideal for running twisted pairs in pole and house work. Used with either two- or four-grooved porcelain knobs. Formed from mild steel, hot dip galvanized.



(e) Telephone Corner Brackets are used where the lead from the pole comes to the building at an angle. Used with either two- or four-groove porcelain knobs. Made in four sizes.

(f) The Oliver Drive Hook is used for wire clamp attachments on buildings, arms or poles. Drive threads hold tight-drive head speeds installation and line erection.

OLIVER
IRON AND STEEL
Corporation
Makers of Pole Line Hardware Since 1894
PITTSBURGH, PENNSYLVANIA

Highlights of the Communications News

(Continued from page 21)

told the National Association of Railroad and Utilities Commissioners Nov. 11 at their annual convention in St. Louis that the regulation setting up a uniform procedure for the furnishing of notice and consent on utility and communications carrier rate increases had been formulated with the advice of the NARUC Washington office and the industry so state commissions and the OPA will be able to perform their respective functions with mutual harmony.

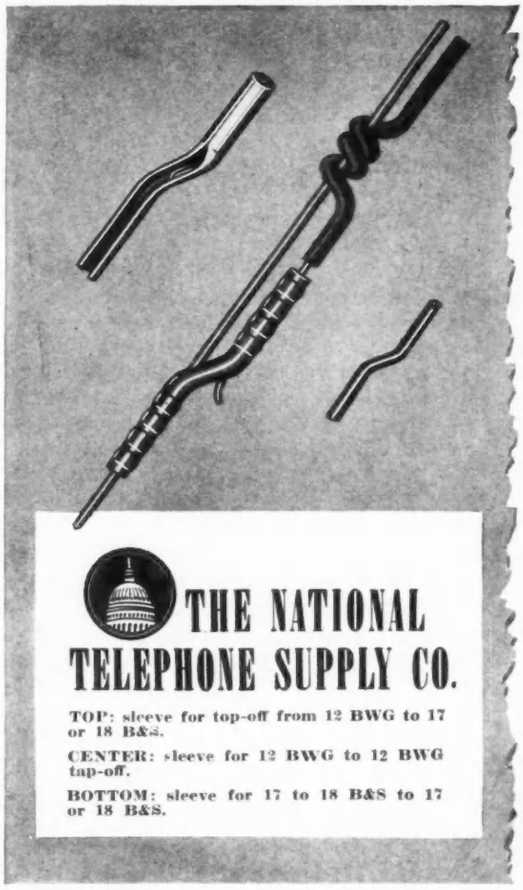
The cooperative spirit of the state commissions was lauded by Mr. Nixon who expressed the belief "it has been fruitful of much good". He stated that it is recognized in some states statutory restrictions place handicaps on the regulatory agencies, making it difficult for them to take the new factors created by the war into account in passing on rate matters. He declared that it was his belief the courts will sustain the state commissions in applying the procedure for OPA review of proposed rate increases in light of the Congressional policy.

Mr. Nixon recounted the legislative history of the OPA in regard to utility rates. He cited that in the original price stabilization act utilities were exempted because of the belief of their being substantially controlled by the governmental regulatory agencies. However, in the emergency stabilization act of Oct. 2, 1942, when other exempt prices were brought

"I guess they're looking for that rubber bone Swankie buried."

V-30-6/23

Drawn for Division of Information, OEM.



THE NATIONAL TELEPHONE SUPPLY CO.

TOP: sleeve for top-off from 12 BWG to 17 or 18 B&S.

CENTER: sleeve for 12 BWG to 12 BWG tap-off.

BOTTOM: sleeve for 17 to 18 B&S to 17 or 18 B&S.

ONE MOMENT, PLEASE!

—That's All It Takes to Make Connections with the New *Nico-Tap*

Now—another time and effort saving convenience for telephone men joins the famous "National" line. The new NICO-TAP, designed for the express purpose of helping you make tap-offs to drop-wires in much less time than ever before.

Nico-Tap sleeves are split — there is no need of wire-cutting. Slip a sleeve on the line wire, compress and you have a tight, efficient connection. Nico-Taps are available in three sizes as shown at left.

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BRANCH WAREHOUSES AT DALLAS, KANSAS CITY, LOS ANGELES, RICHMOND (VA.) AND SAN FRANCISCO

Telephone Engineer

HANDBOOK TABLES

By B. C. Burden

Index—Open wire
Date—Nov. 15, 1942

Physical Properties of Solid Copperweld Telephone Conductors

Size or Inch A.W.G	Actual (Inch) Dia.	BREAKING LOAD (Lbs.) High Strength 40% Cond.	BREAKING LOAD (Lbs.) High Strength 30% Cond.	BREAKING LOAD (Lbs.) Extra High Strength 30% Cond.	WEIGHT Lbs. Per 1000 Ft.	WEIGHT Lbs. Per Mile	RESISTANCE Ohms Per 1000 Ft. at 68° F. 40% Cond.	RESISTANCE Ohms Per 1000 Ft. at 68° F. 30% Cond.	CROSS-SECTION Cir. Mils	CROSS-SECTION Sq. In.
4	.2043	3,541	3,934	4,672	115.8	611.6	.6337	.8447	41,740	.03278
5	.1819	2,938	3,250	3,913	91.86	485.0	.7990	1.065	33,100	.02600
.165″	.1650	2,523	2,780	3,368	75.55	398.9	.9715	1.295	27,230	.02138
6	.1620	2,433	2,680	3,247	72.85	384.6	1.008	1.343	26,250	.02062
7	.1443	2,011	2,207	2,681	57.77	305.0	1.270	1.694	20,820	.01635
8	.1285	1,660	1,815	2,204	45.81	241.9	1.602	2.136	16,510	.01297
.128″	.1280	1,647	1,802	2,188	45.47	240.1	1.614	2.152	16,380	.01287
9	.1144	1,368	1,491	—	36.33	191.8	2.020	2.693	13,090	.01028
.104″	.1040	1,177	1,283	—	30.01	158.5	2.445	3.260	10,820	.008495
10	.1019	1,130	1,231	—	28.81	152.1	2.547	3.396	10,380	.008155
12	.08081	785	—	—	18.12	95.68	4.051	—	6,530	.005129

Modulus of Elasticity: 24,000,000. Coefficient of linear expansion: .000,007,2 per degree Fahrenheit.

under Federal price control, Congress provided that no utility rates could be increased above the Sept. 15 level without giving thirty days' notice to the President or his agency (OPA), and consenting to the timely intervention of that agency. "Inasmuch as this provision of the Act was inserted as a substitute for a provision giving the President an absolute veto power over rate increases," he stated, "it is clear that the Congress believed the existing Federal and state regulatory agencies could and would apply the Congressional policy in passing on rate increases during the war."

War Labor Board Considers Numerous Telephone Wage Increase Cases, Supreme Court to Consider NLRB Appeal Against Southern Bell

THE War Labor Board is still being kept busy with the wage questions of the telephone industry—so far predominatly from the Bell System, but with a number of cases flowing in from the Independent Industry.

Around ten telephone wage controversies are now in the process of being decided by the WLB. Several of these situations are being determined in a routine fashion because the companies and unions had already agreed to wage boosts and WLB approval is necessary under the provisions of the October 2 Stabilization Act. Several Independent companies have presented such cases for this formal approval.

Of considerable interest are a trio of jurisdictional controversies involving the efforts of the International Brotherhood of Electrical Workers (AFL) to invade the field of telephone employees. The WLB is planning to decide on this work situation in two Ohio cases and one in Kansas City involving the pulling of telephone cables in the Southwestern Bell building itself.

An interesting court test on independent labor unions in the telephone field is now before the U. S. Supreme Court. The National Labor Relations Board is seeking to upset a decree of the Circuit Court of Appeals which had ruled against its order to disestablish the Southern Association of Bell Telephone Employees. The IBEW had brought a complaint in 1940 against the Southern Bell to the NLRB on the charge that the Association was company dominated.

The Southern Bell Telephone & Telegraph Co. and the Southern Association of Bell Telephone Employees vigorously assailed the petition of the National Labor Relations Board seeking a writ of certiorari review by the U.S. Supreme Court in briefs, which emphasized that the N.L.R.B. had misstated the views of the lower court and had performed an injustice to the Southern Bell employees because the later has supported their association by a vote of over 83%.

The highest tribunal was asked by both the telephone company and the employees' association to deny the writ petition of the N.L.R.B. The brief of the Southern Bell, submitted by Marion Smith, S. B. Naff and John A. Boykin, Jr., as counsel stated that the N.L.R.B. wanted the Supreme Court to be guided by narrow technical questions and that the highest court should realize the Circuit Court decision had upheld the purposes of the Wagner Act fully. The Southern Bell brief warned that while the government is trying now to preserve industrial peace the N.L.R.B. viewpoint would deny labor its rights and full freedom of organization. The brief added that the Southern Bell serves nine southeastern states and maintains essential telephone communications for the war effort concentrated in that area.

The Southern Association of Bell Telephone Employees in its brief filed by Frank A. Hooper, Jr., and James A. Branch, declared that this case was unique because there had been no satisfaction on the part of any of the employees in regard to representation by their chosen bargaining agency and that there had been no hint or suggestion of any improper relations between the Association and the Company until the organizers of the outside union—the International Brotherhood of Electrical Workers (AFL)—made an unsuccessful attempt to organize a few employees in one exchange. The Association in its brief declared that if the company or any of its officials or supervisory employees were guilty of any improper or unfair labor practice when this effort was made by these IBEW organizers, "The sins of the company should not be visited upon the employees through their chosen representative and certainly not to the extent of a death sentence." The Association added that the lower court had cited how the enforcement of the NLRB decree would be contrary to the policy of the Wagner Act and public policy as well.

FCC-State Commissioner Committee Improves Telephone Regulatory Methods

THAT the progress of the special state commissioner committee cooperating with the FCC in studies of telephone regulatory problems will

Reliable

PROTECTION IS RELIABLE INSURANCE

The original design of the Reliable B27 Protected Cable Terminal is a proved standard of protection and maintenance economy. Equipped with the Reliable self-cleaning sawtooth discharge blocks, static discharges are dispelled without lag time, and unnecessary grounding and dirty carbon trouble are eliminated. All connections are made in front within easy reach of the lineman—no need to remove fuses or reach around terminal. The detachable mounting bracket permits one man installation. Exceptionally rugged construction guarantees long, dependable service.

Ask for Descriptive literature and prices.

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OVER 30 YEARS SERVICE TO THE UTILITIES
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make regulation of the telephone industry much more expeditious and effective in the future was predicted in the annual report of that committee to the NARUC convention Nov. 11.

The major portion of the report was devoted to a review of the study of simplification of the separation procedure and the hearings which had been held on that subject. This effort should be continued, the report stated, since a simplified separation procedure holds great possibilities for further simplification of telephone rate making. The report added that state commissions have jurisdiction over the bulk of telephone revenues, but the FCC is an essential element in the regulation of the industry as a whole so that the telephone business is peculiarly one where cooperation is important to attain uniformity in the treatment of certain problems.

The next study by the cooperating committee is to be on the license contract of the Bell System, the report stated. The committee, however, emphasized that it was aware of the demands of the armed forces upon the personnel of the telephone industry and regulatory agencies. It also recognized that the war has burdened the telephone industry with very heavy traffic and believed that the remaining studies should be so planned and undertaken as not to absorb an undue amount of manpower needed in the industry.

The report was submitted by Chairman John J. Murphy of the South Dakota Commission who succeeded Wisconsin Commissioner Robert A. Nixon after the latter had resigned to take the OPA Transportation-Utilities Directorship. New Jersey Commissioner Crawford Jamieson was designated to fill the vacancy of Mr. Nixon. The other members of the Committee are: Frederick G. Hamley of Washington State, Leon Jourolmon, Jr., of Tennessee, and Richard J. Beamish of Pennsylvania.

Puerto Rican Non-Military Communications Supervised

The Secretary of War was authorized by the Board of War Communications Oct. 22 to supervise, use and control all non-military communications facilities and systems in Puerto Rico.

At the same time, the BWC approved an order No. 22 requiring that all submarine cable circuits leased to Government agencies must be first cleared with the Board before the lease can be effected. Cable leases already made must be reported by the carriers to the BWC.

Phone Exchange Sold

Ensign, Kas. — Ensign's long controversy over its telephone exchange came to an end recently when a cooperative organization of townspeople, headed by the city council, bought from Mrs. Harry Momyer, her telephone exchange property at her stipulated price of $500 and paid cash for it.

The sale became effective at midnight September 30, the time the state corporation commission had given Mrs. Momyer permission to close the exchange if it were not sold, and Mrs. Momyer, owner of the exchange for 15 years added, "Mrs. Momyer and her son will leave Ensign at exactly one minute after midnight."

Levi Odle, a mail carrier, is president of the Ensign Cooperative Telephone Company. The exchange will be moved to the home of Mr. and Mrs. Russell Pegram, and Mrs. Pegram will be the exchange manager for the co-operative company. Mr. Pegram operates a garage in Ensign.

Signal Corps Officers To Attend S.O.S. School

Signal Corps Officers will be included among the approximately 100 officers who will start the Services of Supply course at Fort Leavenworth, Kan., to train them for duty on the staffs of the S.O.S. Service Commands.

UNINTERRUPTED SERVICE

with Non-Grounding Rare Gas Arresters

Used for many years by leading Railroads for vital Telephone, Telegraph and Signal Circuits.

Type MCD (illustrated) interchangeable with your present carbon block protectors.

Write for Catalog 39-A describing
Arresters Anti-Noise Relays
Terminal Strips Potheads Housings

L. S. BRACH Mfg. Corp.
55-63 Dickerson St. Newark, N. J.
Signal Circuit Engineers Since 1906

CONSTRUCTION CREWS CHOOSE
DICKE POLE LINE TOOLS
Construction men choose Dicke Tools because of their toughness, ruggedness, durability and convenience.
From post-hole digger to pay-out reel you'll find them uniformly satisfactory. There's a Dicke Tool built to meet your construction needs—whatever they are.

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NATIONAL DEFENSE

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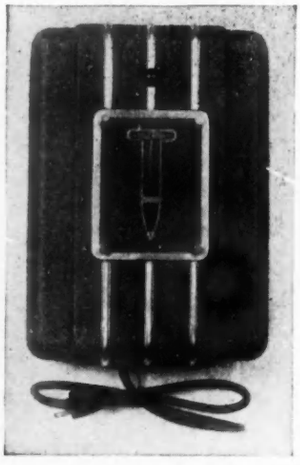
has

PRIORITY

While "all-out" National Defense co-operation is taxing our production facilities — We are proud we have been able to continue to make satisfactory deliveries to our government and to our customers in the telephone field.

TELERING

Reliable ringing service is essential in providing satisfactory telephone service.



Directly converts Commercial Alternating Current to Telephone Ringing Current—Current Consumption Negligible—Positively NO radio interference.

Use TELERING and provide the MOST reliable service at the LEAST cost.

Order through your jobber or direct from

TELKOR, Inc.
ELYRIA, OHIO

New Company Formed

International Telephone and Telegraph Corporation announces that its two associate manufacturing companies in The United States, International Telephone and Radio Manufacturing Corporation and Federal Telegraph Company, have been merged and the name of the corporation resulting from the merger is Federal Telephone and Radio Corporation, located at Newark, N. J. From now on the business will be conducted under the new name.

Subsidiaries of I. T. & T. have been for many years among the largest manufacturers of telephone and radio equipment elsewhere throughout the world, but its manufacturing in the United States has grown up largely in the past two years into an organization employing approximately 5,500 persons and 800,000 square feet of operating space. This organization is now devoted almost entirely to the production of communication and radio equipment for the war effort.

I. T. & T. has announced plans also to proceed with the construction of the first unit of a new factory at Nutley and Clifton, New Jersey, which will become the home of Federal Telephone and Radio Corporation, and it is planned that all laboratory and manufacturing operations associated with I. T. & T. in the United States shall eventually be centered there.

Early in 1941, I. T. & T. organized International Telephone and Radio Manufacturing Corporation and established a telephone and radio factory and laboratories, and in June, 1941, the latter company acquired control of the Federal Telegraph Company, an important producer of radio equipment and radio transmitting tubes.

International Telephone and Radio Manufacturing Corporation has been engaged primarily in the telephone end of the business making automatic telephone central office and private branch exchange equipment, telephone instruments, Selenium Rectifiers, which have many valuable applications in the electrical industry in general and in war equipment, Intelin materials and supplies which constitute a new technique for insulating high tension power cable, and this company has also developed a new type of high frequency cable.

In addition to its manufacturing companies, I. T. & T. subsidaries operate the principal telephone systems of Argentina, southern Brazil, Chile, Peru, Cuba, Puerto Rico, and Spain and one of the two large systems in Mexico. They also operate most of the radiotelephone stations and wire facilities which connect the Latin American countries by telephone with each other, with the United States and the rest of the world.

Edward J. Walsh

Edward James Walsh, an executive of Federal Telephone and Radio Corporation, of Newark, a subsidiary of International Telephone and Telegraph Corporation, died suddenly Nov. 5 at his home, 114 Waverly Place, New York City. He was 43 years of age.

Mr. Walsh was a native of Providence, Rhode Island. He graduated from Brown University in 1920 with the degree of A.B. in Economics and the Harvard Business School with a degree of Master of Business Administration, in 1922. He began his business career with the Westminster Bank of Providence.

Mr. Walsh joined the International Telephone and Telegraph Corporation, in the office of the Comptroller, in 1927. Within two years he was made comptroller of the Company's South American interests. He returned to this country in 1934, and in 1937 he was sent to Antwerp, Belgium, to act as comptroller of the International Telephone and Telegraph Corporation's manufacturing subsidiary there. The German army occupied Antwerp in 1940, but Mr. Walsh remained at his post there until recalled in January, 1941. Since that time, he has been in an executive capacity with the Federal Telephone and Radio Corporation in Newark.

Mr. Walsh is survived by his widow, Mrs. May Walsh, and two brothers, William James and JamesA.Walsh.

SAVE TIME — REFER TO
TELEPHONE ENGINEER'S BUYER'S GUIDE

Wire Chief's Training Course

(Continued from page 25)

shows a typical gas filled toll cable arrangement.

Where nitrogen gas is used to locate sheath openings in either aerial or underground cable, the gas is admitted to the cable by drilling a hole in a sleeve near the section of cable known to be in trouble. A valve is then screwed into this opening and gas admitted being careful to keep the gas pressure less than 50 pounds. The cable sheath openings can be detected by listening for the sound of escaping gas at sleeves and other points likely to be the source of trouble, and by painting the sheath or sleeves at points under suspicion with soapsuds.

When a section of underground cable is bad as a result of a sheath opening somewhere between manholes it is often possible to dry it out sufficiently to restore service pending the cutting in of a new section or the clearing of the point in trouble. Most effective results are obtained when gas is applied to the defective section from manholes on each side of the break.

The equipment necessary for the use of gas consists of a tank of oil pumped nitrogen, pressure gauges, regulating valves, rubber hose, and valve fittings.

Use of Parafine Oil In Cable Splicing

THE splicing of pulp insulated cable particularly in cold weather requires that **parafine oil** be mixed with parafine for proper results. The oil makes the insulation much easier to handle and minimizes damaged insulation due to cracking. The proportion of oil to be added to parafine will depend on the temperature. The following table can be used as a guide in determining the amount of oil to be added.

Temperature (F)	Oil %
Below 10°	50
25° to 35°	35
35° to 55°	25
55° to 75°	15

Although the use of parafine oil was originally suggested primarly for use with pulp insulated cable, it will also be found helpful in the splicing of paper ribbon insulated cable during cold weather.

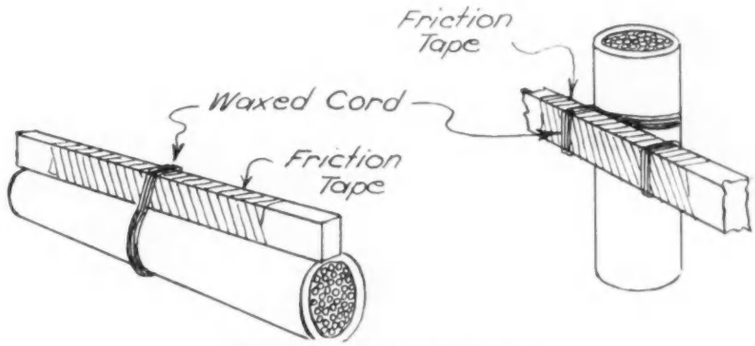


Fig. 7—Tying forms to main frame.

Termites Not Welcome

TEXAS CREOSOTING TREATMENT "LOCKS OUT" VICIOUS AND DESTRUCTIVE PESTS

Termites — those vicious and destructive marauders — and other enemies of telephone poles are permanently locked out by the empty cell creosoting process of the Texas Creosoting Company.

As effectively as if each cell and fiber was padlocked against the intruder, the Texas treatment guards your poles, assures you they are sound and strong, adds years of life to their service. Obviously this means low cost per year—helps you keep overhead down where it belongs.

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BRUTE STRENGTH!

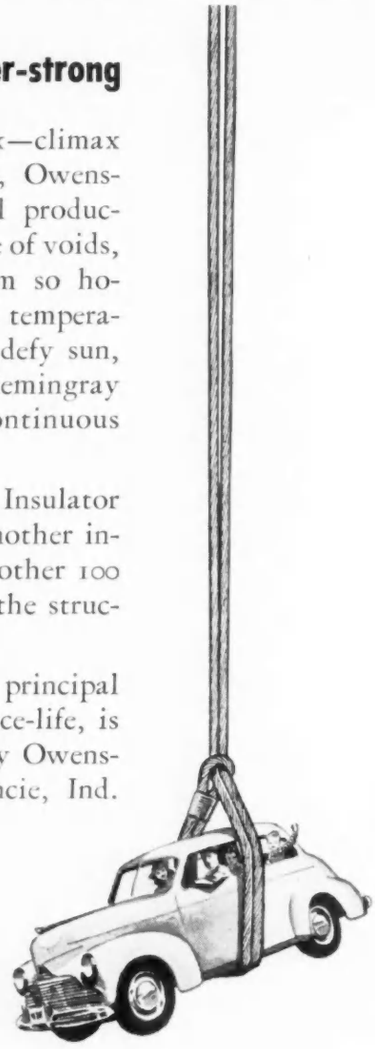
2 Things Make Hemingrays Super-strong

First, a "secret" glass batch-mix—climax of 87 years of experience. Second, Owens-Illinois step-by-step quality-control production. These result in Hemingrays free of voids, stresses and strains . . . makes them so homogeneous that sudden changes of temperature leave them unimpaired. They defy sun, rain, hail, snow and sleet. One Hemingray user reports . . . "thousands in continuous service for over 50 years."

Fact is, a 100-year old Hemingray Insulator could be remelted and made into another insulator that, in turn, would last another 100 years, because time does not affect the structure of their glass.

Hemingrays are sold *only* through principal jobbers. Their cost, figured in service-life, is measured in cents. Manufactured by Owens-Illinois, Hemingray Division, Muncie, Ind.

Hemingray No. 42 . . . favorite for toll lines—its long leakage path keeps rural "toll" lines trouble-free.



Using A. S. T. M. procedure, a recent test of stock Hemingray Insulators by Purdue University technicians shows a strength of 3,000 lbs. Such brute strength would easily support the family sedan—fully loaded!

OWENS-ILLINOIS

HEMINGRAY Telephone & Telegraph Insulators

EXPORT AGENTS: INTERNATIONAL STANDARD ELECTRIC CORP. • NEW YORK

Cable Terminations

WHEN it is necessary to terminate paper insulated cable in other than a sealed type terminal it is standard practice to splice a short length of textile insulated cable to the paper insulated cable. This cable serves the dual purpose of permitting the cable to "breath" without so much danger from moisture damaging the insulation and it also is more rugged and can stand more handling without damage than can paper insulated cable. A minimum length of 6 to 8 feet should be used. If the moisture conditions are bad the **tip cable** should be textile insulated and enameled cable. The tip cable should of course be thoroughly boiled out in parafine before being formed up.

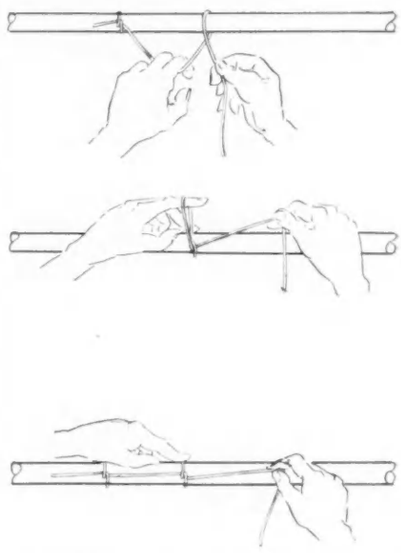


Fig. 6—Several steps in lacing cable forms.

Forming Up Terminated Cables

CABLES which terminate on main frames, or on terminal strips in building terminals, after being thoroughly boiled out are formed and then laced up with a waxed cord. This results in a compact neat appearing wiring form. The forms may be of either the single or multiple branch type. Fig. **5** illustrates the difference between a single and multiple branch form. It will be noted that the pairs which break off from the main form are called "skinners".

The skinners are positioned along the form by means of a "lockstitch." This stitch has the merit of being self locking and if properly made will result in a neat and serviceable form.

The several steps in "sewing" cable forms with waxed thread and using the lock stitch is illustrated by Figure 6.

Examination No. 20

MISCELLANEOUS CABLE NOTES

1. What is the purpose of a cable bond?
2. What is the standard practice with reference to bonding U. G. cables?
3. Under what conditions are insulating joints likely to be required?
4. Are bonds required on cable suspended by the spinner method?
5. Why is the extensive grounding of a cable system carried on high voltage joint use poles desirable?
6. How can sheath openings be located (approximately) on toll cables which are maintained under gas pressure?
7. What purpose does parafine oil serve in connection with splicing work?
8. Explain the need for tip cable where paper insulated cables are terminated in other than a sealed type terminal?
9. Explain the process of installing a stub cable in a sealed type terminal.
10. How should a form to be installed on a main frame be treated at points where it makes contact with the iron work of the frame?

First cut off a length of thread long enough to reach to the end of the form. Make a secure starting stitch at the butt end of the form next to the cable sheath. Using both hands pass the free end of the cord through the looped end and holding the loop taut with the index finger of the left hand pull the free end tight. When pulling the free end snug be sure and hold the stitch in the proper position using the index finger of the left hand to insure that all knots appear on the same side of the form. At the end of the sewed form make a double lock stitch to terminate the cord and then cut off the surplus end.

On a multiple branch form additional cords are required for each branch and these are each applied with a starting stitch at the point where the branch breaks off from the main form.

In terminating cable on a main-frame the incoming cable are usually carried up to the frame from a cable vault below the frame. The lead sheath should be extended up at least 12" above the floor to guard against damage to the form due to sweeping or mopping. The main form should be carried vertically along an angle support, and on each shelf the lateral cable form should branch out as shown. The cable form after being thoroughly boiled out should be wrapped tightly with boiled out linen tape. This tape should be applied to both the main and lateral branches. At all points where the form is in contact with the iron work of the main frame the iron work should be taped with friction tape and the form wrapped with light fibre. The form

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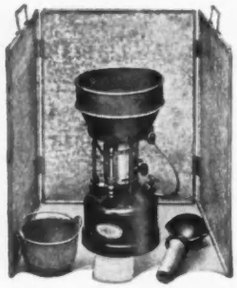

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should be lashed to the frame to hold it in place. Use waxed cord for this purpose making a tie similar to that shown in Fig. 7.

Termination of Lead Cable In Sealed Terminals

SEALED type terminals are available from the factory either with or without stubs. If stubs are not furnished then the cable splicer must terminate either the main cable (if at the end of a run of small cable) or cut in a short stub. This is accomplished by removing the face plate of the terminal and after stripping off the lead sheath and boiling out the conductors the conductors are soldered to the soldering terminals inside the terminal. The cover is then carefully replaced and the self soldering nozzle is heated so that the lead sheath of the cable and the nozzle form a water tight joint. It is very essential that the cable sheath be thoroughly cleaned and scraped and fluxed with a plumbers candle before it is inserted in the nozzle. After the cable has been sealed in the nozzle the front plate should be carefully replaced being sure that the gasket fits properly, and the terminal should then be filled with compound by removing the threaded plug in the top of the terminal and pouring in compound which has been heated to a temperature of 375 deg. The terminal should be filled and then allowed to cool after which some additional compound will need to be added. The compound precludes the possibility of moisture getting into the terminal.

Kellogg Offers New Service

The Kellogg Switchboard & Supply Company recently announced a new service in connection with its activities to help telephone companies operate successfully under today's difficult war-time conditions. For some time now, Kellogg has been operating a Priorities Service Department, which department has been of aid to operating companies in keeping them informed of the frequent and sometimes puzzling changes in priority regulations as they affect the telephone industry.

The newest addition to the Kellogg war-time services, concerns the inventory restriction laws of the P-130 Priorities Rating Form. The inventory restrictions clause calls for the reduction of inventories to what is termed a

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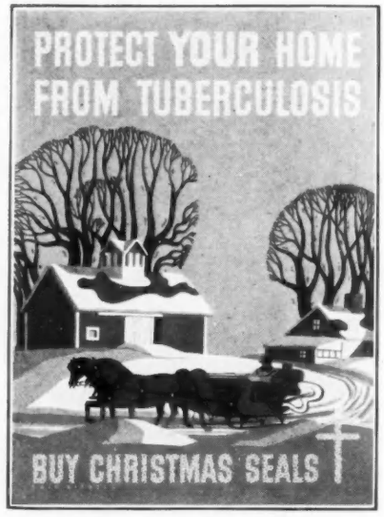

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The photographer for the Chicago Herald-American recently visited the Kellogg Switchboard & Supply Company and took a full page of pictures of Kellogg women war workers in the Herald-American search for "Miss Victory". Here Mr R. C. Krueger (left) Kellogg's Advertising Manager and Mr. C. N. Simon, Resident Production Engineer for the U. S. Army Signal Corps, inspect the page of pictures that appeared in a recent issue of the newspaper. The Kellogg plant is working at top speed, producing various communication equipment for our armed forces throughout the world.

"practical working minimum" before deliveries of additional material may be expected.

Naturally, this means that some operating men will have to quickly dispose of certain materials which they have in excess, if they are to be allowed to obtain other materials which they sorely need.

To help telephone companies dispose of their surplus inventories, Kellogg has offered the help of its entire field force and sales offices—without charge or obligation.

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To Review Utah Toll Rate Reduction

The Utah Supreme Court has decided to review the finding of the Utah Public Service Commission reducing the intrastate message toll telephone rates of the Mountain States Telephone & Telegraph Co. to the level of the A. T. & T. interstate Long Lines scale of rates. A temporary stay of the commission order during the appeal proceedings was granted by the court.

The Mountain States company had filed a petition for rehearing which was denied by the Commission, but it obtained a writ of certiorari from the state supreme court. The company filed a bond guaranteeing about $10,000 a month which represented the difference between the lower rates ordered by the commission and those in effect at the present time. The rate reduction, amounting to about $120,000 a year, was described by the Mountain States company as endangering its earning of a fair return on its investment.

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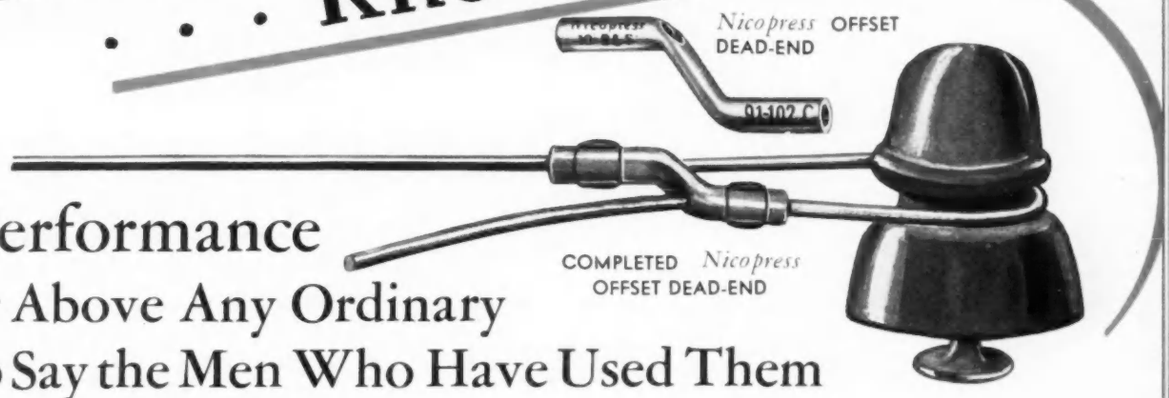

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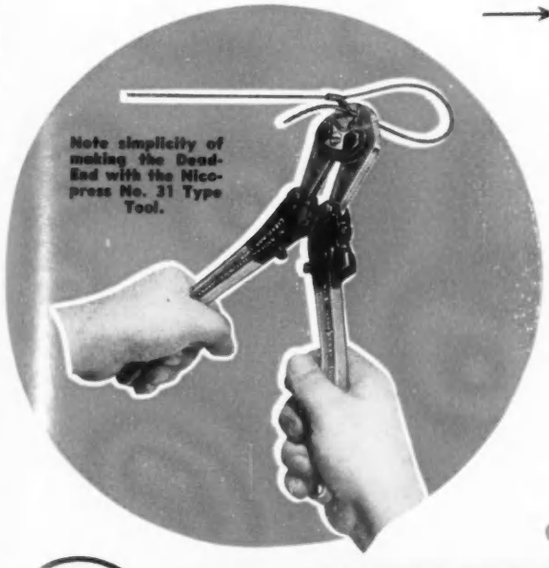
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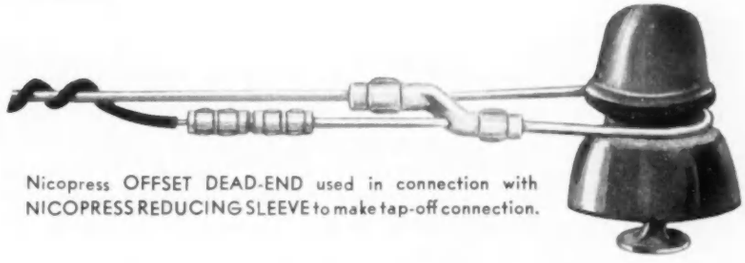
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